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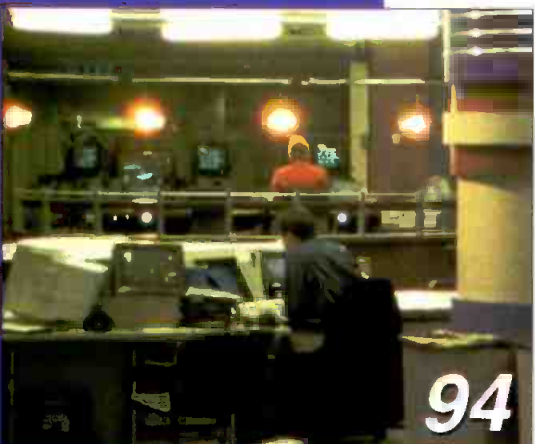
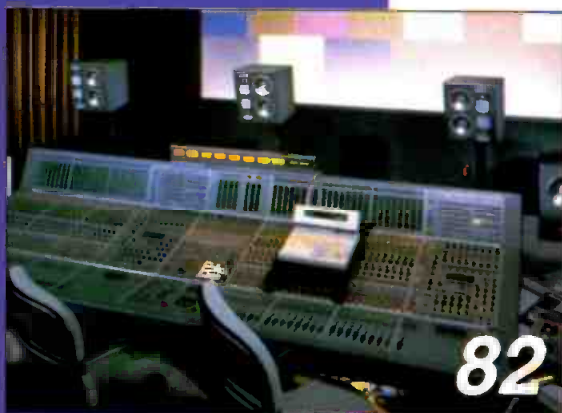
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ON THE COVER: Further demonstrating the popularity of moving into all digital broadcast, WLS-TV, ABC's owned-and-operated station in Chicago, has installed a Solid State Logic Aysis Air all digital broadcast console. Photo by Dave King.

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913/967-1905 fax

FREEZE FRAME

A look at the technology that shaped this industry.

Do you remember?

Predictions are always dangerous. In what year and month did former BE Editor Jerry Whitaker make this forecast? "By 1999 ATV will be transmitted by a majority of TV stations in the U.S. ATV will carry over-the-air television through the year 2000, when fiber-optic delivery of 'real' HDTV will begin." Correct entries will receive a Broadcast Engineering T-shirt. Send entries to: brad_dick@Intertec.com.





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I want my TV – and PC!

As little as a year ago, the computer industry was predicting that viewers would soon be switching off their TVs and using their PCs to watch television. Guess what? That's not happening. Instead, viewers are increasingly watching TV and surfing at the same time. A recent report by Showtime Networks and Paul Kagan Associates confirms a trend reported early this year in *Broadcast Engineering*. Television viewers are increasingly *multitasking*, using both the computer and TV at the same time. Fully one-quarter of all households, almost 23 million homes, now have PCs and TVs in the same room. What's amazing is that in 80 percent of these homes, viewers watch TV and surf at the same time. (See Paul Kagan Associates report "Connected Household" at www.pkbaseline.com.)

The research suggests today's viewers are pressed for time and want to be able to multitask as much as possible. It therefore becomes natural to both watch TV and surf at the same time.

Many expected TV viewing to drop as the PC invaded the TV viewing room. However, that's not what's happening. In the convergent household, TV viewing (eyeball time) actually increases. Broadcasters should love that.

In addition, these convergent households have some of the most desirable (at least to a marketer) demographics. Their household incomes are significantly higher (\$64,000 vs. \$38,000), and these consumers tend to have more college degrees (44 percent vs. 20 percent) than other households.

These households are electronic gadget havens. When it comes to entertainment and digital products, these consumers are adopters: 97 percent have a VCR, 88 percent have a CD player, 50 percent have a camcorder, 17 percent have a satellite system and, at twice the national average, 13 percent have DVD players. These factors combine to create a highly desirable audience for advertisers.

A study by DFC Intelligence (www.dbpwebcasttrack.com) shows that 38 percent of affiliate TV stations have some form of streaming video or network link-back capability. These stations are repurposing their local programming to capture viewers — even when those viewers aren't watching the TV set! Of the affiliate stations surveyed, 318 host some form of video programming. Some merely provide links back to their networks, but others provide full-time or on-demand video programming. Where's the advantage? Glad you asked.

Today, a severe thunderstorm passed through my city. I'm at work and don't have a TV or radio, but I do have a Net-connected PC. As the storm arrived, I simply logged onto a local TV station's live radar site. Bingo, I'm getting the latest (real-time) weather feed. It was up-to-the-minute accurate and tailored for my neighborhood. No 15-minute, multicounty, delayed-feed-from-Atlanta radar sweep for me!

With an increasing number of viewers having access to the PC in the same room as their TVs, (not to mention Net-connected PCs at work) it makes sense for stations to use their greatest strength, which is in the creation of local programming, to capture this audience. Cable can't do it. Satellite can't do it. Only over-the-air broadcasters can do it.

So what's your excuse?



Brad Dick

Brad Dick, editor

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Another consumer digital format

In the May news column, Larry Bloomfield indicated that both Sony and JVC are working on 15Gb disc systems. I assume these will be competitive with TiVo and Replay.

This trend to home "mass storage" devices is of particular interest to me, since I have been pioneering for 18 years a method of indexed-video electronic publishing. It is based on downloading or "timeshift delivery" of indexed material to any read/write video platform. The content can then be read out like electronic microfilm. *Quickscan* is patented and has been licensed by Dow Jones and Rupert Murdoch, but it has not yet been put into commercial use.

The bottom line is that while TiVo and the like are designed to capture and manage the garden-variety TV jungle, it is possible to easily create dedicated indexed-video services, which can bring Internet-type content (reformatted) to the millions of VCRs in place worldwide with a limited degree of interactivity and high interactivity to disc recorders. For more information, go to www.quickscan.org.

GEORGE VAN VALKENBURG
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I'm tired of low pay

Dear Editor:

I'm chief engineer of a (location withheld) TV station. For what will become obvious reasons, I request you do not publish my name.

One of the things that bothers me the most about being a broadcast engineer is the pay (actually, the lack of it). Trying to get a raise out of some managers is like pulling teeth. It is almost impossible. I can't understand why a company who would offer so many incentives to "come on board" won't (later) give raises. I don't want to be like some I know who look around one day to discover they're making just about the same thing they were hired at 10 or 20 years ago. I keep up with wages. I've changed jobs a lot, but I shouldn't have to.

I've noticed a new breed of mostly young, upwardly mobile techs that change jobs very often. But watch out if you want to settle into a community, buy a home and build a life. We live in times where corporate broadcasting will take full advantage of your comfort.

There's an old joke about the guy who wanted a raise, so he quit. He walked out the back door, got in his car and drove around the block to the station's front door. Going back into

the station, he asked to be hired in the vacant engineer's position, whereupon he was rehired at a much higher rate. I know of others in station departments who swap jobs every three to four years, for this very reason.

It reminds me of the farmer and his mule. When asked if he was working a mule too hard, the farmer replied, "He's just a mule, besides \$2 buys me another one any day of the week!"

I've heard there are a few good jobs out there. Unfortunately, they are less seen and more talked about than Bigfoot, or the Loch Ness monster.

I don't know what the answer is, but I know this industry has too many lawyers, bean counters and stupid managers. Perhaps contract engineers will be the wave of the future. I know that's going to be my next gig.

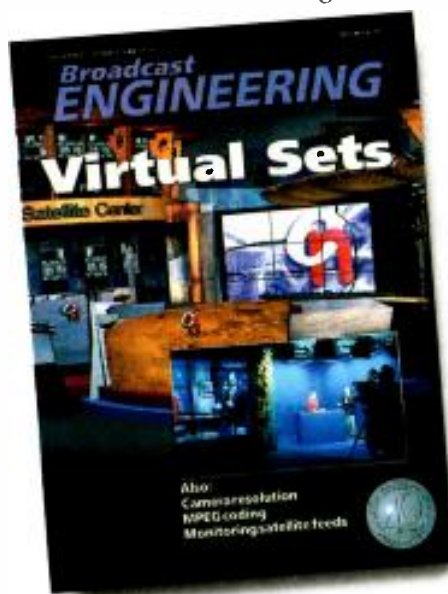
Thanks BE, I feel better already. ...

NAME WITHHELD ON REQUEST

This month's T-shirt winners:

Tom Alderson
G. Yanulis
Mike Gianutsos, Texolve Inc.
John Tonti, Express
TeleVideo
Carlton Davis, Johnson-Davis Broadcasting

Have you won your *Broadcast Engineering* T-shirt? See page 8 for this month's FreezeFrame question. Correct entries receive a "digital" *Broadcast Engineering* T-shirt.



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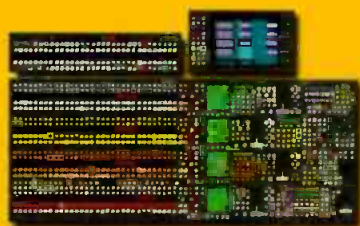
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Residents pose challenge to Denver broadcasters' towers

BY LARRY BLOOMFIELD

In addition to the technical and financial challenges of meeting the DTV deadline, many broadcasters face the additional obstacle of overcoming public opposition to the most visible link of the transmission chain: towers. In one market, a group of broadcasters is finding that public opposition may be the biggest hurdle in meeting its DTV deadline.

The group, known as the Lake Cedar Group (LCG), consists of Denver's KCNC-TV (CBS), KRMA-TV (PBS), KMGH (ABC), KUSA-TV (NBC) and KTVD-TV. All four of the stations placed their broadcast towers on Lookout Mountain during the early 1950s, when the underlying land was not zoned. Two other stations, KWGN and KDVR are also located on Lookout but are

zoned differently and decided not to join the LCG. The site was chosen and developed as the location for the metro antenna farm because it offered a nearby, unobstructed location from which to cover the Denver metro area.

Denver, the 18th largest U.S. television market, is in the midst of the second wave of migration to digital television. In its attempts to comply with the



Seven Denver television stations have their broadcast towers and antennas located at nearby Lookout Mountain. A coalition of five stations faces opposition to its plan to build a single DTV tower and remove existing NTSC towers. Photo provided by Virtual Topics Inc.

FRAME GRAB

A look at the issues driving today's technology

TV stations repurpose on web

Simulcasting gets TV stations on the net.

Total TV affiliate stations	840
TV affiliates with web sites	318
Percent affiliates hosting some form of on-demand video	37.9%
Percent (of those sites) providing simulcast or on-demand video	67%
Percent (of those sites) providing only links back to network	33%
Overall percent of TV affiliates with simulcasts	25.5%
Overall percent of TV affiliates providing links to networks	12.5%

SOURCE: Digital Broadcasts & Programming/Web Cast Track www.dbpwebcasttrack.com

FCC schedule and placate the desires of Jefferson County residents, the coalition hopes to ultimately consolidate the antennas to one tower and minimize the visual impact on Lookout Mountain.

Despite efforts to consolidate new digital antennas onto a single tower structure and eliminate the older NTSC towers, Denver broadcasters continue to face staunch opposition for nearby residents and a recalcitrant county government that is unwilling to approve LCG's plans.

The conflict between broadcasters and area residents has been building for years. The mountain was zoned residential in the early to mid 1960s, long after the television stations had been in place. The broadcast owners did not attempt to have their land zoned specifically for the purpose it was being used for: broadcast transmission. Since there

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didn't appear to be any real issues at that time, broadcasters, were allowed to continue their broadcast operations.

As time passed, other transmission facilities, including later TV allocations, FM broadcast, two-way radio base stations and repeaters, microwave relays and telephone services, also began to take advantage of the site as demand for frequency use and broadcast services to the metro Denver area increased.

Concurrently, the Lookout Mountain area became popular as a place to live. From the late 1970s on, homes began to spring up. As the broadcast population on Lookout Mountain began to grow, it became necessary for the new broadcast facilities to apply for conditional use permits.

By the late 1980s, citizens began to lobby the Jefferson County government to remove the communications towers, in particular the tall TV transmission towers. Jefferson County even proposed a zoning ordinance that would require the removal of the towers when they had been depreciated for Federal tax purposes.

That proposal was defeated by a coalition of the broadcasters, but in the early 1990s Jefferson County did pass a nonconforming use ordinance specifically directed at the taller broadcast towers, as opposed to other shorter (under 200 feet) towers used for two-way cellular, etc. The ordinance permits the continued use of a facility as it was being used at the time of enactment but precludes any expansion. It states that no antennas can be added, but antennas can be replaced on a one-for-one basis if the replacement antenna carries the same service. In addition to this, the ordinance does not permit any tower strengthening.

DTV forced broadcasters to formulate plans to create a facility that would address their future needs while incorporating the county's desire to consolidate. A general outline was submitted to the Jefferson County Commission in early February 1997. The plan was for Denver broadcasters to form a joint venture to create a consolidated DTV tower/facility. The original plan included the removal of several older existing towers after 2006 or when analog broadcasts were terminated. The final plan, as presented, would

have removed two of the four NTSC facilities immediately by relocating the analog transmission of KCNC and KRMA to the proposed facility and included space for all of the FM stations presently located on Lookout.

The plan included the use of the combined land holdings of the broadcasters (approximately 80 acres) and the acquisition of other parcels, where possible, for the facility and to create a greenbelt buffer around it. In an earlier vote, the Jefferson County Planning Commission voted 6-1 in favor of the project.

The current controversy revolves around opposition to an application filed by LCG to the Jefferson County planning commission to rezone the area for communications and to approve its antenna and tower consolidation plan.

In an all-or-nothing effort, a neighborhood opposition group called CARE (Canyon Area Residents for the Environment) launched a public campaign to remove the broadcast towers. With a NIMBY (not in my backyard) approach, CARE contended the standards for RFR are incomplete and too liberal. The group argued that since the FM stations on Lookout were above the accepted levels that the TV stations should pay the penalty.

CARE's opposition to the LCG proposal has been based on the supposed threat of an increase in RF, although it would continue to be well below the safety standards included in both the FCC requirements, and Jefferson County ordinance. CARE challenged the RF standards and wanted them reduced by factors of hundreds to levels that would have precluded any broadcast.

To educate any of the misinformed residents and address unfounded issues, LCG further proposed to include directional antennas in order to prevent transmission in the direction of local homes and a school on Lookout Mountain.

In a reprise vote by Jefferson County in late July, the matter was turned around in a 3-1 vote to deny the tower. The county said that LCG had not performed due diligence in finding other sites and that its plans were not complete. ■

CEMA proposes new digital broadcast service

The Consumer Electronic Manufacturers Association unveiled its proposal for a new mobile broadcast service to be placed on UHF channels 60-62 and 65-67.

CEMA states its Mobile Multimedia Broadcast Service would provide 5.1 channel audio, weather and navigation data, Internet and data services over 70 channels at up to 384kb/s per channel.

Added to this is what CEMA calls "important high-capacity data services, with seamless, robust and interference-proof reception in the mobile environment also transmitted in spectrum efficient multiplexed 'ensemble' service."

CEMA President Gary Shapiro touts the proposed service as a boon for broadcasters and equipment manufacturers.

"This is an exciting and historic opportunity for the commission, for mass media entities, for receiver and transmitter equipment manufacturers and for the American public," Shapiro said.

In its filing to the FCC, CEMA states MMBS "will present 'scalable' reception opportunities to consumers whereby their costs/value assessments determine whether they purchase equipment capable of receiving the full complement of 5.1 channel audio, at CD+ quality, and a host of data features and services, or (at another extreme) simply monophonic reduced-quality audio reception or simple data services."

CEMA describes the implementation of its MMBS in this 36MHz by designating it exclusively for MMBS by creating and empowering an advisory committee to evaluate, assess, integrate and to structure the system.

CEMA has strongly supported the 8VSB-modulation scheme for DTV. However, the organization touts COFDM as the superior choice for its mobile services.

"CEMA recognizes that the mobile reception environment is one of the most demanding technical challenges to overcome. Past studies have demonstrated the advantages of coded orthogonal frequency division multiplex (COFDM) modulation to overcome difficult mobile multipath reception

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environments successfully," CEMA states in its filing.

"Further, if the data rate available in MMBS can be flexibly distributed over different program/data channels (with

casters swinging in the wind but will create a new consumer product line for their members."

If CEMA is successful with its MMBS project it could hobble today's broad-

FCC revises local ownership rules

The FCC relaxed its local TV ownership rules to allow broadcasters to own more than one station in a market if it meets the requirements designed to protect the number of individual media outlets.

Until the action (Report and Order — FCC 99-209) was signed into law by the Commission, broadcasters have been barred from owning more than one TV station in the same area.

Under the new regulations, TV stations in larger markets are free to merge if the markets meet "minimum voice floors," or the minimum number of independent commercial and non-commercial radio and television stations, cable providers and newspapers.

It remains to be seen how these new rules will play in situations such as that which exists with Gannett Broadcasting's Channel 11 in San Jose and its recently acquired TV station Channel 20 only 60 miles away in San Francisco. The new rules will allow two stations in

"Perhaps CEMA has decided that HDTV and 8VSB will not produce the quick revenue that they had hoped for years ago." — Mark Aitken, Sinclair Broadcasting

the use of the COFDM ensemble structure), the data capacity can be dynamically changed depending on the service offerings and requirements."

It's no surprise how Sinclair Broadcasting views CEMA's selection of COFDM. Mark Aitken of the Sinclair's New Technology Group said, "Perhaps CEMA has decided that HDTV and 8VSB will not produce the quick revenue that they had hoped for years ago. So, to save face they now propose a new service that will leave today's broad-

casters by sapping advertising revenue away to a new service. Such data services might be equally well transmitted by DTV that could be provided by today's broadcaster.

The organization hopes to measure support for the proposed service and set service and technical parameters in a meeting in Washington D.C.

For more information, visit CEMA's website at www.cemacity.org.

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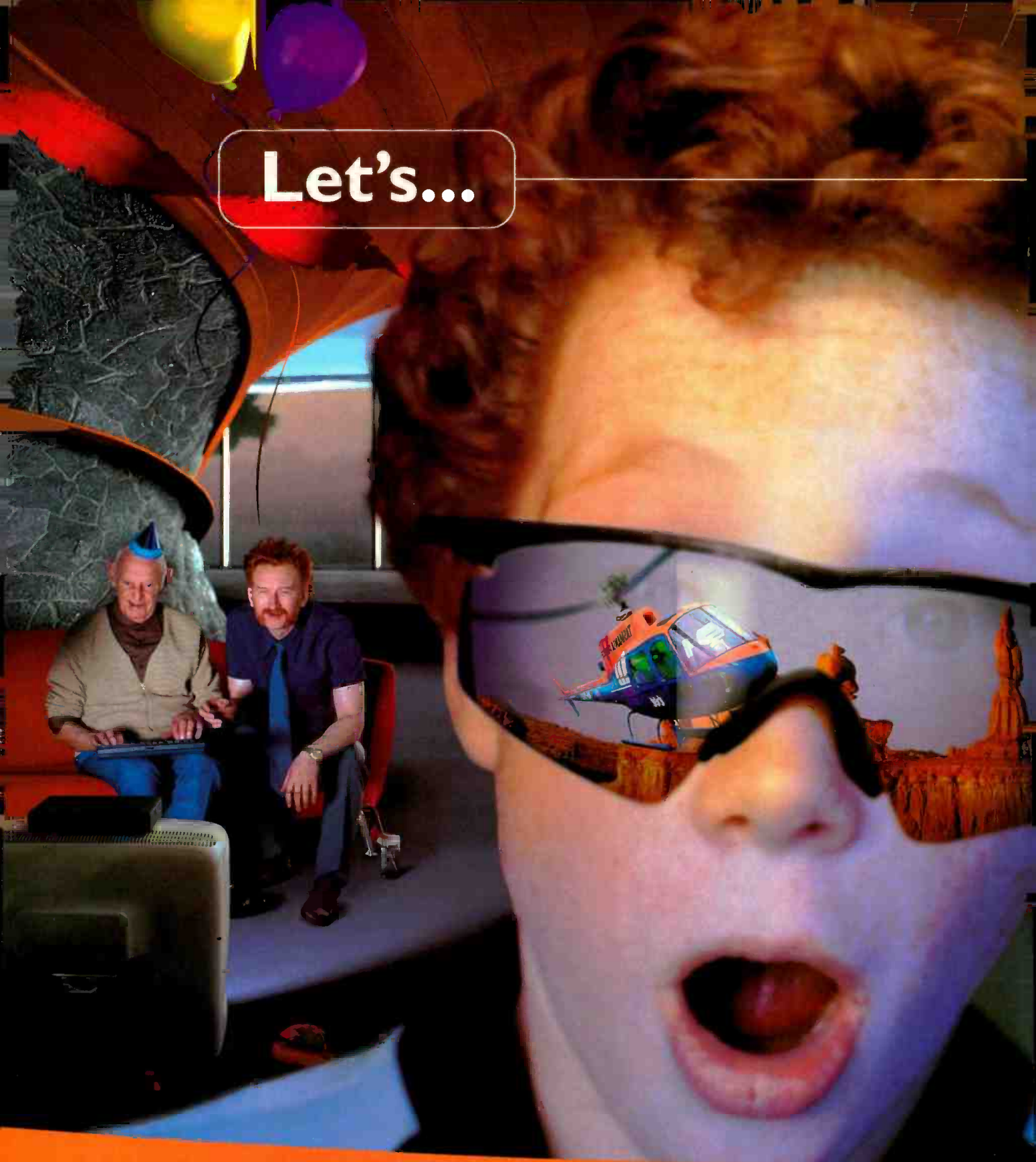


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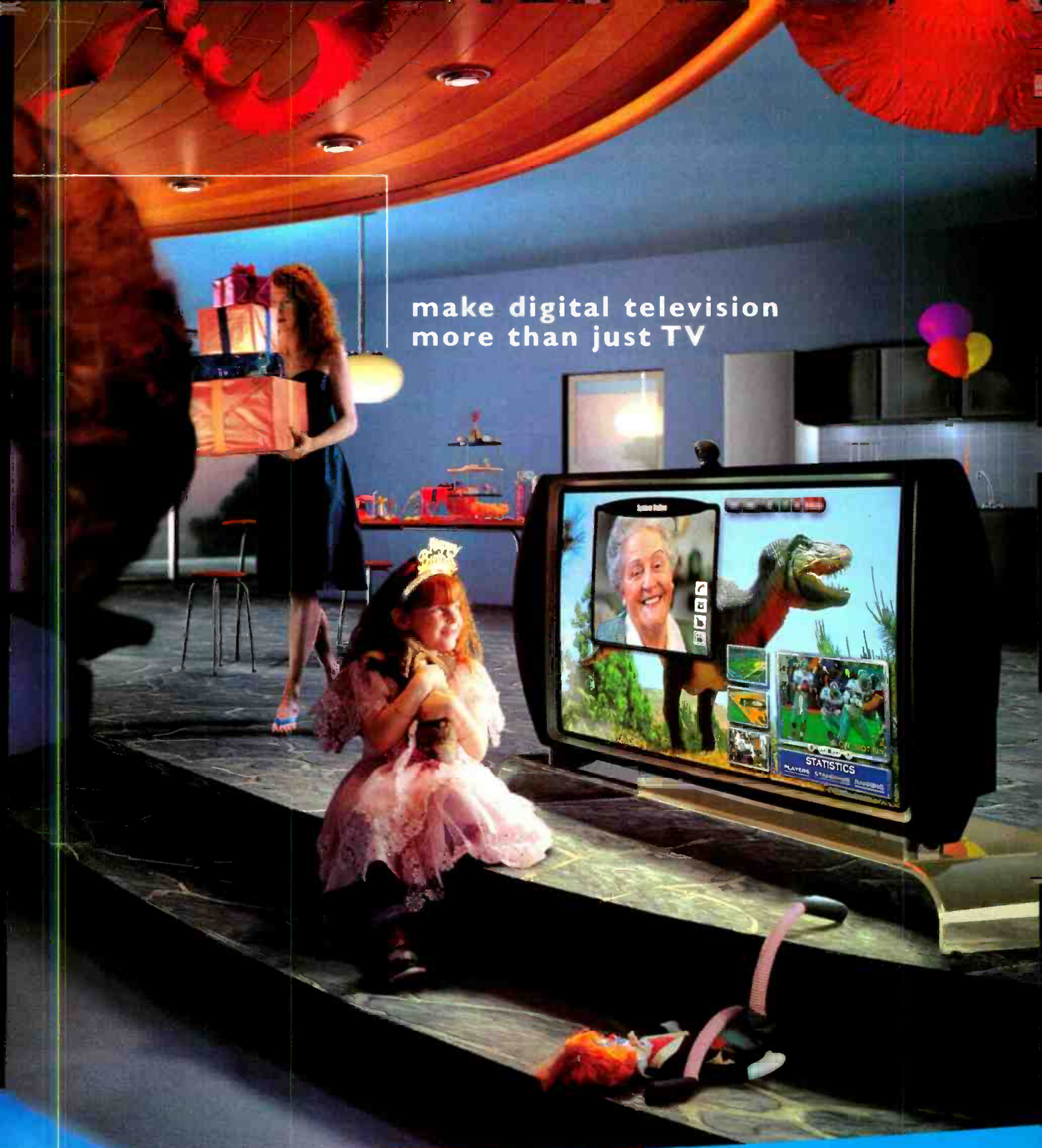


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separate designated areas to merge, no matter how close the markets are together.

The new ownership rules also establish waivers for failing stations, failed stations and unbuilt stations. Under the waivers, stations can purchase stations that have been off the air for more than four months or financially struggling stations that have low audience share.

The FCC wants to get unbuilt stations

on the air and the new rules will permit waivers allowing mergers that result in bringing these unbuilt stations to air. The FCC will even grant waivers if one of the merging stations had gone dark or is in danger of going dark.

There are approximately 70 TV local marketing agreements that were entered into before Nov. 5, 1996, the day the FCC had originally proposed to crack down on LMA's. The FCC

will grant them a five-year grace period. Those 10 or so operators that entered into an LMA after that date will have a two-year grace during which they will have to either divest or otherwise come into compliance with the new laws.

The FCC has also revised its broadcast and cable/MDS ownership attribution rules. The attribution rules define what constitutes a "cognizable interest" for purposes of applying the ownership rules. A Report and Order (FCC 99-207) recently adopted improves the precision of the attribution rules and makes them more clear to financial markets. ■

Grass Valley Group purchases Tektronix's video division

A private investment group announced that it will purchase Tektronix's Video and Networking Division and run the new company under the Grass Valley Group name.

The new owners have formed what they are calling "a new, privately held digital broadcast and video equipment company, Grass Valley Group Inc." The acquisition is subject to normal governmental regulatory agency scrutiny.

Although the announcement was made in early August of this year, negotiations began nearly two months earlier. As part of the deal, Tektronix will retain a 10 percent equity interest in GVG. The transition is expected to close this month.

The major force behind the move to independence of the new Grass Valley



Terence Gooding,
Grass Valley
Group CEO

Group is Terence Gooding, GVG's new chief executive officer. Gooding is an entrepreneurial industrialist who is no stranger to the electronics, test equipment and their related industries. Gooding, along with Tim Thorsteinson, president of the Tektronix Video and Networking Division (VND) and the new president and chief operating officer of the new GVG Inc., lead an investor group in the acquisition.

Gooding is currently co-chairman of the board of Wavetek Wandel Goltermann Inc., the second largest international communications test company. During the past 35 years, Gooding has successfully led five technol-

ogy companies through product development and complementary acquisitions into growth markets. He has built two small companies to more than \$1 billion in revenues.

GVG will maintain its compliment of approximately 700 employees worldwide with headquarters in Nevada City, CA. Other GVG centers of note are Beaverton, OR, and the new company's ongoing digital broadcast and video product software-development efforts that will to be supported by the Tektronix development center in Bangalore, India. In addition to this, GVG will maintain a presence in Europe, headquartering in London with sales and technical support in Paris and Cologne, Germany. The Asia/Pacific market will be supported from facilities in Tokyo and Hong Kong.

Thorsteinson said the new Grass Valley Group has the resources to serve a variety of emerging markets. As the transition to digital production and transmission takes hold, "We will remain vigilant to serve the needs of the industry as many operations transform themselves into media companies capable of delivering content to multiple digital pipelines ranging from the Internet to E-Cinema.

"The new GVG will hold fast to new technology such as Kalypso while we look forward to the recent alliances we have with such organizations as Avid, Accom and Ampex Data Systems," Thorsteinson said.

For more GVG information, see www.grassvalleygroup.com. ■

Harris acquires Pacific Research & Engineering

Harris Corp. and Pacific Research & Engineering announced that Harris will purchase the audio console manufacturer in a cash tender offer that values PR&E at \$9.5 million.

The boards of directors of each company have unanimously approved the transaction. The transaction is contingent upon customary conditions, including the tender of at least 90 percent of PR&E's outstanding stock and normal governmental regulatory agency scrutiny. The deal is expected to close this month.

Jack Williams is Pacific Research & Engineering's founder, chief executive officer and chairman. Williams has been responsible for the design of many of the company's most well known products.

PR&E began in a spare bedroom in Williams' Southern California home back in 1969 when he was distributing Ampex tape recording equipment. Since then names like Newsmixer, BMX and Tomcat have become common names at many broadcast facilities. PR&E will continue to manufacture its broadcast studio products and provide turnkey studio design/integration services to the worldwide broadcasting industry with the added resources of Harris Corporation.

"We're excited about the acquisition which brings two quality organizations together. Starting this business and growing with it has been a tremendous experience personally," Williams said, "and

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through out our history we have maintained a certain set of values and responsibilities to our clients, and we're very please to be going with Harris Corp., which shares these values."

"The bringing together of these two organizations will build on our complementary strength in serving our industry," PR&E President Don Naab said.

Williams and Nabbs will continue with PR&E in yet-to-be-determined roles. ■

IBEW threatens strike over AT&T's treatment of cable workers

The International Brotherhood of Electrical Workers picketed AT&T facilities and the union has threatened to strike over its claims that AT&T has unfairly treated some of its cable system workers.

The AT&T purchase of TCI included Jones Intercable Systems, an earlier TCI acquisition that was completed before the AT&T deal. IBEW represents some

330 cable technicians that came along with the former Jones/TCI operation at several locations in Illinois through Locals 21 and 134.

When TCI acquired Jones, they recognized the collective bargaining agreements that were in place with IBEW, but the union contracts expired on June 15, 1999. To facilitate negotiations, the contracts were extended for a month and then on into early August.

The crux of the union case is that AT&T is trying to establish a three-tier work force, with cable employees being paid less and receiving reduced benefits compared with phone technicians who work for AT&T and are represented by the IBEW.

"At a time when the telecommunications industry enjoys unlimited opportunities, there is no reason for a large and successful company like AT&T to stonewall its own workers," IBEW International President John J. Barry said.

The union foresees cable technicians eventually doing much of the same work other AT&T technicians are doing as AT&T beefs up TCI's cable infrastructure to provide local phone service,

along with high-speed Internet access, over cable lines.

AT&T spokesperson Mike Pruyn said AT&T is not trying to establish a different class of workers.

"We're hopeful that ABIS (AT&T Broadband and Internet Service) will be able to negotiate a fair and equitable new contract with the IBEW as soon as possible," Pruyn said.

ABIS promises to continue service to all its customers irrespective of the outcome of these rounds of negotiations. ■

Wink provides data-casting services to FOX, DirecTV

FOX broadcasting and DirecTV will begin providing interactive programming and other datacasting services with software and equipment from Wink Communications.

Wink's technology will permit FOX to enter the realm of interactive programming and advertising starting as early as this fall. The Wink software works locally or through a network

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with a variety of delivery methods and a special set-top box as well as with select TV sets currently being distributed through out the U.S.

"Wink affords FOX a unique opportunity to offer interactive enhancements for our most popular programming, and we look forward to improving the entertainment experience for our view-

grades and is a free service to the viewer. The software can be integrated into local broadcast operations as well to enhance and supplement the network's various campaigns.

FOX will begin by applying Wink's TV-based e-commerce capabilities to 30-second interactive advertisements through use of interactive overlays that

large and committed audience toward electronic commerce on television."

Wink enhanced broadcasting has been available in Japan since October 1996 and in the United States since June 1998 where it is currently available to viewers in five states.

In January, DirecTV announced that it would offer Wink Enhanced Broadcasting to its customers and expects to have Wink's interactive technology installed in at least four million of its system's receivers by the end of 2001.

Thomson Consumer Electronics and Hughes Network Systems (HNS) have signed license agreements with Wink Communications to manufacture Wink-enabled DirecTV systems. DirecTV expects to provide Wink-enabled services on RCA DirecTV System receivers developed by Thomson and HNS beginning in the first half of 2000. The companies will be collaborating with licensed manufacturers of DirecTV receivers to accelerate the transition to Wink-enabled models. ■

Wink's technology will permit FOX to enter the realm of interactive programming and advertising.

ers," said Larry Jacobson, executive vice president of the FOX Television Network. "We are also tremendously interested in the e-commerce capabilities Wink provides both the network and its advertisers, as we expect to pursue those opportunities aggressively."

Wink's software allows its Internet content to be broadcast with existing programs and commercial material, in either analog or digital. The system requires no network infrastructure up-

will provide additional information in the form of small text and graphics.

Maggie Wilderotter, president and chief executive officer of Wink Communications said, "We are thrilled that FOX will be creating and airing Wink-enhanced programming and advertising. FOX's exciting programming and creative leadership hold great promise for compelling interactive enhancements, and present great opportunities for advertisers interested in leveraging a

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improved upon with closer coordination with the broadcasters include better communications with the viewer (signal level, configuration, setup), and standards for channel and sub-channel indicators, input and output signals and connectors and ability to drive a NTSC receiver or monitor. Yes, there are standards for the coding but not for the user's convenience.

It should be no more difficult to tune between over-the-air broadcast sta-

tions than it is for cable or satellite channels. Close coordination between sender and receiver make that possible and simpler for the viewer.

Compliance with allocations planning factors, the other need for DTV receiver testing, can only be determined in the laboratory.

The new DTV service requires that 1600 new allocations be implemented in already crowded TV bands. In order for the FCC DTV allocation plan

to work it is essential that DTV receivers meet the planning factors for sensitivity (noise figure), and for co-channel, adjacent channel and taboo channels (DTV and NTSC).

Viewers with receivers that have less than satisfactory performance may experience problems with reception. This will delay the transition to DTV that offers viewers spectacular high definition pictures and sensational quality sound. ■



VENDOR

Linc Reed-Nickerson is president of Broadcast Technology LTD, Inc.

Less than two years ago I was helping a major TV set manufacturer rest its first ATSC receiver. The signal source was the local PBS station, and we had far

more questions than answers. After two days of determining why things wouldn't

work, we were making pictures. Now, I used the term receiver, but what the invited guests didn't see was all the breadboard equipment hidden under

the table. A few months later, with a couple of exceptions, those that had DTV receivers at the Consumer Elec-

It reminds me of the space program; we started with Alan Shepherd's suborbital flight, and a few years later had a man on the moon.

tronics Show in January 1998 had their hardware hidden under the table as well. That is, if they had a DTV receiver at all.

It reminds me of the space program; we started with Alan Shepherd's sub-orbital flight, and a few years later had

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the audio engineers. Because the console is used for multiple productions, the file recall setup attribute became an important feature to help to ensure consistency in our product."

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a man on the moon. While there were many glitches along the way, we achieved our goals while creating new technology.

Perhaps you might not consider an ATSC receiver rocket science, but the determination to overcome the problems with early receivers is just as intense. Today we have groups of "scientists" working to make the best ATSC receiver possible. Early in the process, a number of engineers pub-

set receiver development back by months when suddenly we had to deal with the low-band VHF channels. If it were not for the superior performance of 8VSB in the presence of impulse noise and co-channel interference, use of these channels would not be possible.

The first indication I had that the TV set manufacturers were on the right track was a call I received from one station engineer. He couldn't understand why his professional receiver

hovering at the theoretical signal-to-noise threshold for 8VSB.

There are still variations from manufacturer to manufacturer in TV set performance, and the second round of professional receivers are just now becoming available. The improvement in performance is nothing short of dramatic.

We need to go back to the locations where careful alignment of an outside antenna was required and indoor antennas wouldn't work at all, and retest with the receivers available today. We need to understand that continued improvements will occur and set prices will drop as volume sales start. Today we are all guilty of sending mixed and negative messages to the public by referring to testing that is clearly ancient history.

It is time for another round of receiver tests. We need fresh data to present to the public, to silence the naysayers, and to tell the world ATSC is a good and valid choice for digital television transmission. ■

Today we are all guilty of sending mixed and negative messages to the public by referring to testing that is clearly ancient history.

lished papers that suggested ways receiver performance could be improved with no change to the transmission standard. Clearly the adoption of the ATSC standard is an evolutionary process, much like the space program.

We need to remember that the FCC

and his 8VSB measurement set could neither decode nor quantify signal performance at his transmitter when an off-the-shelf receiver at a shopping mall 25 miles away was happily displaying pictures. We traced the problem to mistuned transmitter that was



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MPEG audio compression

BY MICHAEL ROBIN

Consider an AES/EBU audio datastream with 20-bit resolution and a sampling frequency of 48kHz. The essential bit rate is equal to:

20 bits per sample x 48kHz = 960kb/s.

A stereo pair requires a bit rate of 1.92Mb/s.

Compared to a CCIR 601 datastream with a total bit rate of 270Mb/s and an essential bit rate of approximately 215Mb/s, the digital audio bit rate represents less than 1 percent of the video bit rate. Given the sensitivity of the ear to audio distortion this means that in many studio applications, audio need not be compressed at all. Even if the video signal were compressed by a factor of 2.3 (e.g. Digital Betacam) the uncompressed digital audio bit rate would still only represent approximately two percent of the compressed video bit rate. Audio compression is simply not necessary. If the video bit rate is compressed by a higher ratio such as 50, the audio and video bit rates become comparable and audio compression makes sense.

Audio compression concepts

The MPEG audio compression methods remove redundant digital audio data based on human psychoacoustic characteristics and their limitations. This system of audio coding is best described as a perceptual coder rather than a waveform coder. In a perceptual compression process, the codec (cod-

like a spectrum analyzer. It separates the audible sound spectrum into 25 frequency bands called critical bands. The bandwidth of the critical bands is proportional to the center frequency and varies from 100Hz (below 500Hz) to 3500Hz (at 13500Hz).

Masking effects: The HAS suppresses some sounds in the presence of others, a

The human auditory system (HAS) has certain characteristics that are exploited by audio compression systems.

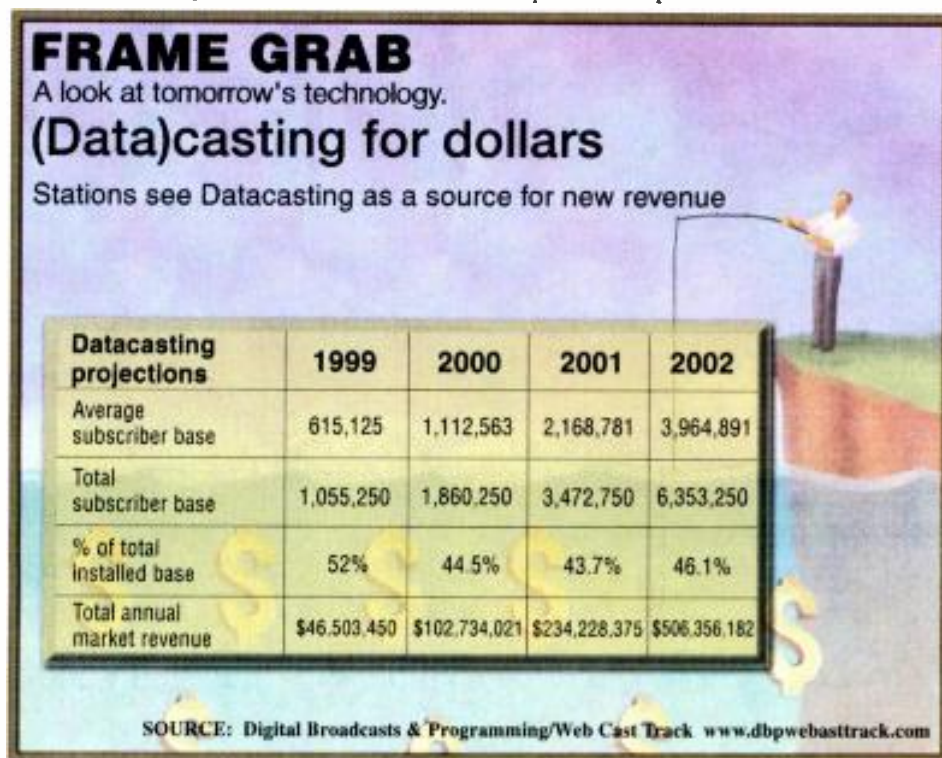
er/decoder pair) does not attempt to recreate the input signal waveform. Its goal is to ensure that the re-created signal sounds natural to a human listener. The human auditory system (HAS) has certain characteristics that are exploited by audio compression systems. These are:

Spectral response: The HAS behaves

process called auditory masking.

Frequency response: The sensitivity of the ear decreases at low and high frequencies and is dependent on the sound pressure level (SPL) being relatively flat (± 10 dB) at 120dB SPL.

As shown in Figure 1, temporal masking results in a delay in the perception of a sound (premasking) and a slow decay in its perception (post masking). While the sound is maintained, other sounds of lower amplitude are masked. As shown in Figure 2, the threshold of hearing is frequency dependent. The solid curve represents the HAS threshold of hearing. Sounds at various frequencies with SPL levels below this curve are inaudible. The dotted curve shows how a 5kHz sound raises the threshold of hearing and effectively masks lower amplitude sounds of neighboring frequencies. Simultaneous frequency domain masking results in the raising of the perception threshold of sounds with frequencies in the vicinity of a higher amplitude sound. In the presence of a complex audio spectrum, such as music, the threshold is raised at all frequencies. The beneficial effect is the masking of background noise during the reproduction of music. The



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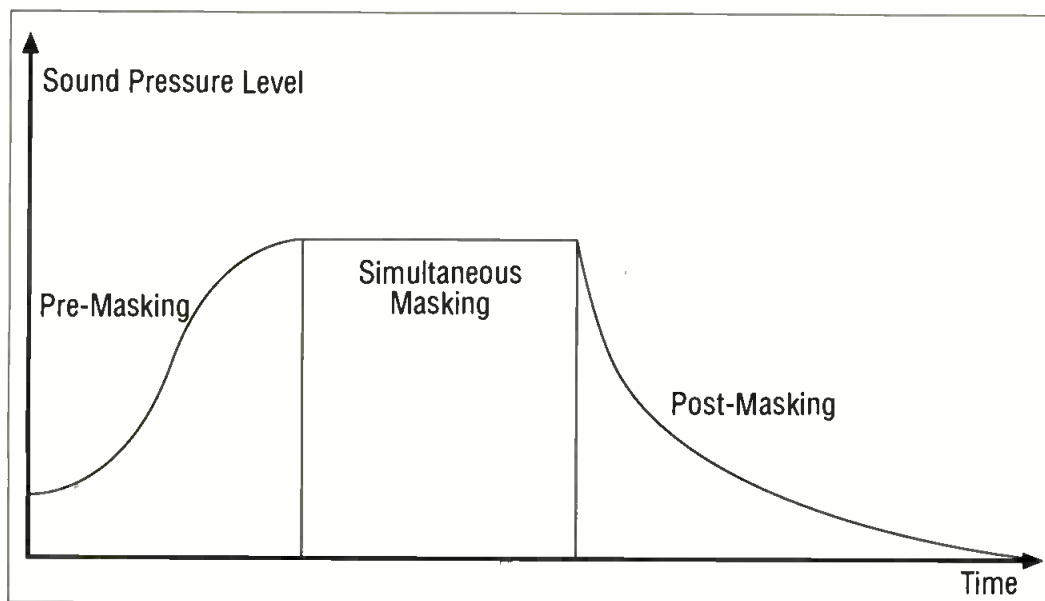


Figure 1. Temporal masking results in a delay in the perception of a sound (premasking) as well as a slow decay in the sound's perception (post masking). Simultaneous masking occurs between these two effects. Sounds of lower amplitudes are effectively masked throughout this time.

parts of the signal that are masked are referred to as irrelevant. The parts of the signal that are removed by a source encoder are referred to as redundant. To remove the irrelevancies in the audio signal the encoder contains a psychoacoustic model. It analyzes the input signal in consecutive time blocks and determines for each block, the spectral components of the input signal by applying a frequency transform.

MPEG audio compression

MPEG works in phases such as MPEG-1 and MPEG-2. In both, there are three distinct layers of sophistication of the audio compression,

sometimes incorrectly referred to as levels. These layers represent a family of coding algorithms and are identified as Layer I, Layer II and Layer III. The complexity of the encoder and decoder, the encoder/decoder delay and the coding efficiency increase when going from Layer I to Layer II and to Layer III.

Layer I has the lowest complexity and is suitable for applications where the encoder complexity plays an important role. It requires a simple coder and therefore must use a higher bit rate or lower quality will result. In MPEG-1 the compressed data rates are between 32kb/s and 448kb/s.

Layer II requires a more complex encoder and a slightly more complex decoder. It is directed towards one-to-many applications (i.e. one encoder serves many types of decoders). It is designed to be the most appropriate layer for everyday purposes. Compared to Layer I, Layer II is able to remove more of the signal redundancy and apply the psychoacoustic threshold more efficiently. In MPEG-1, the compressed data rates are between 32kb/s and 384kb/s.

Layer III is more complex and is directed to the lower bit rate applications, as it has a better redundancy and

irrelevancy extraction from the enhanced resolution of its filterbank. In MPEG-1, the compressed data rates are between 32kb/s and 320kb/s.

MPEG-1 supports three sampling frequencies: 32kHz, 44.1kHz and 48kHz and four modes of operation:

- Monophonic mode (single channel).
- Dual monophonic mode (e.g. dual language sound track).
- Stereo mode.
- Joint stereo mode (Only the lower input audio spectrum is transmitted separately; the upper half of the spectrum is transmitted as a joint signal).

Figure 3 shows a simplified block diagram of an MPEG encoder. In this encoder, a filter bank splits the input signal into 32 sub-bands in an essentially lossless and reversible manner similar to the HAS process. Bands in which there is little energy result in small signal amplitudes that can be transmitted with short word lengths. Thus each band results in variable length samples but the sum of all the sample word lengths is less than that of the input and so a coding gain can be obtained.

An FFT (fast Fourier transform) of the audio is used as the input to a masking threshold algorithm to determine what scale factor and quantizing level to use. A scaler boosts low amplitude signals

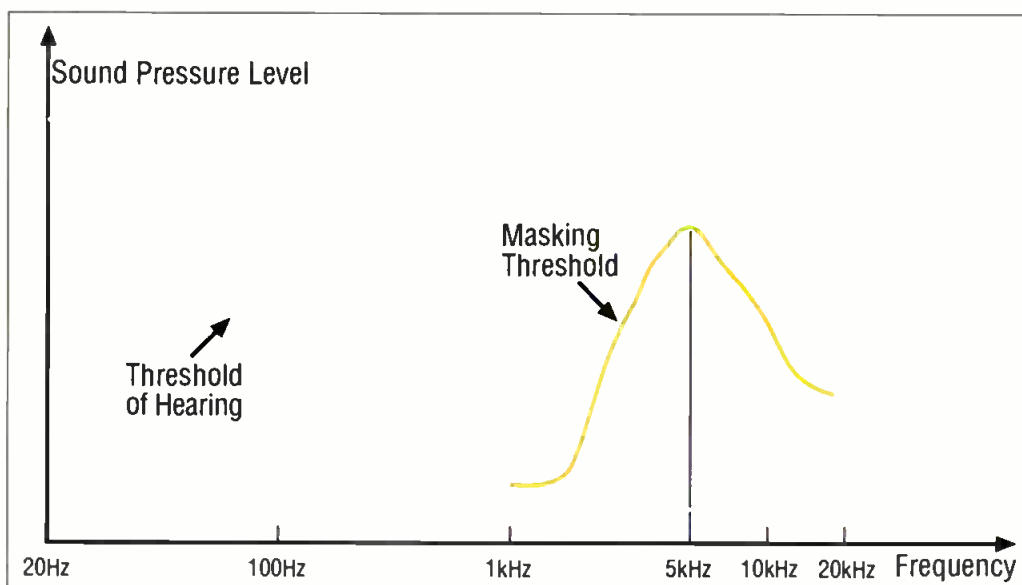
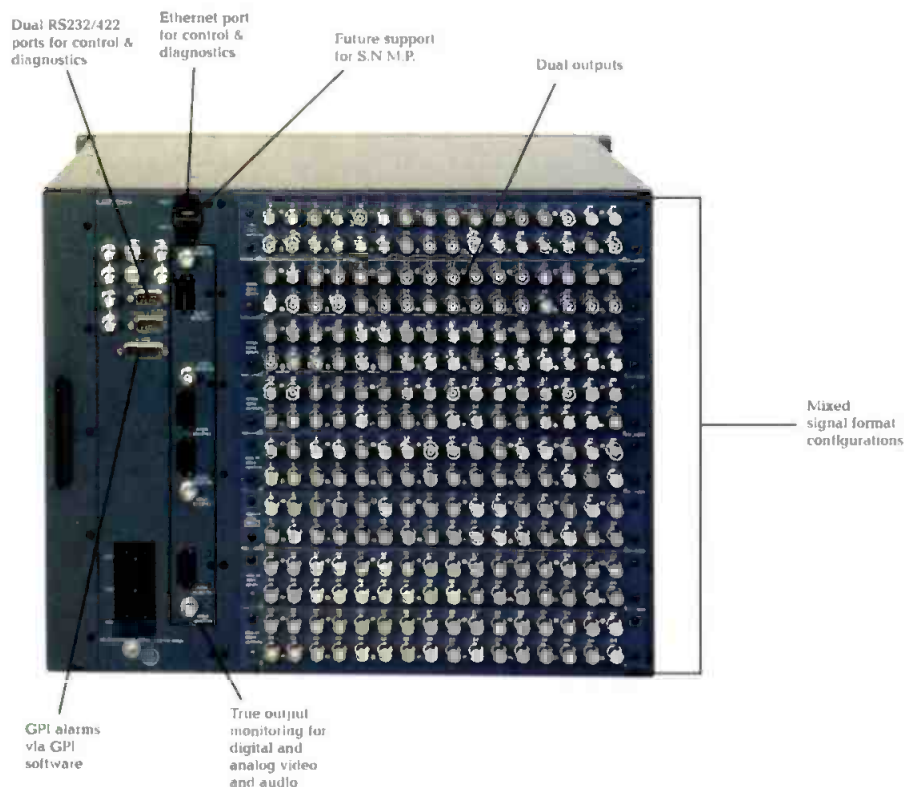
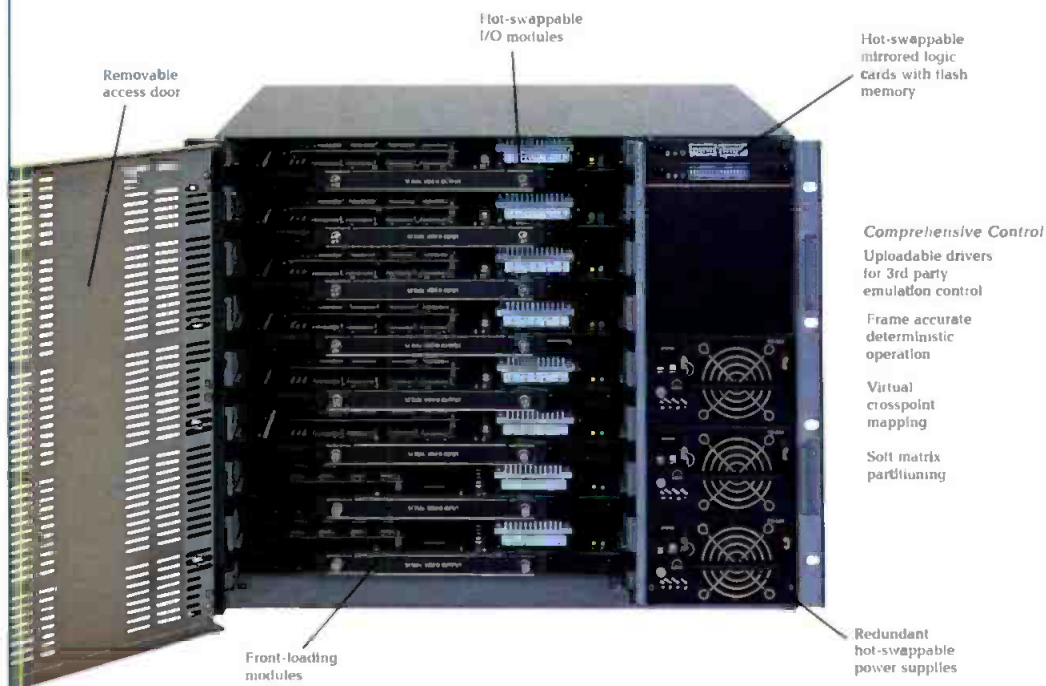


Figure 2. The threshold of hearing (solid line) is frequency dependent. Simultaneous masking occurs around the frequencies contained in a sound, raising the perception of hearing and effectively masking nearby frequencies. The dotted curve shows how a 5kHz sound raises the threshold of hearing and effectively masks lower amplitude sounds of neighboring frequencies.

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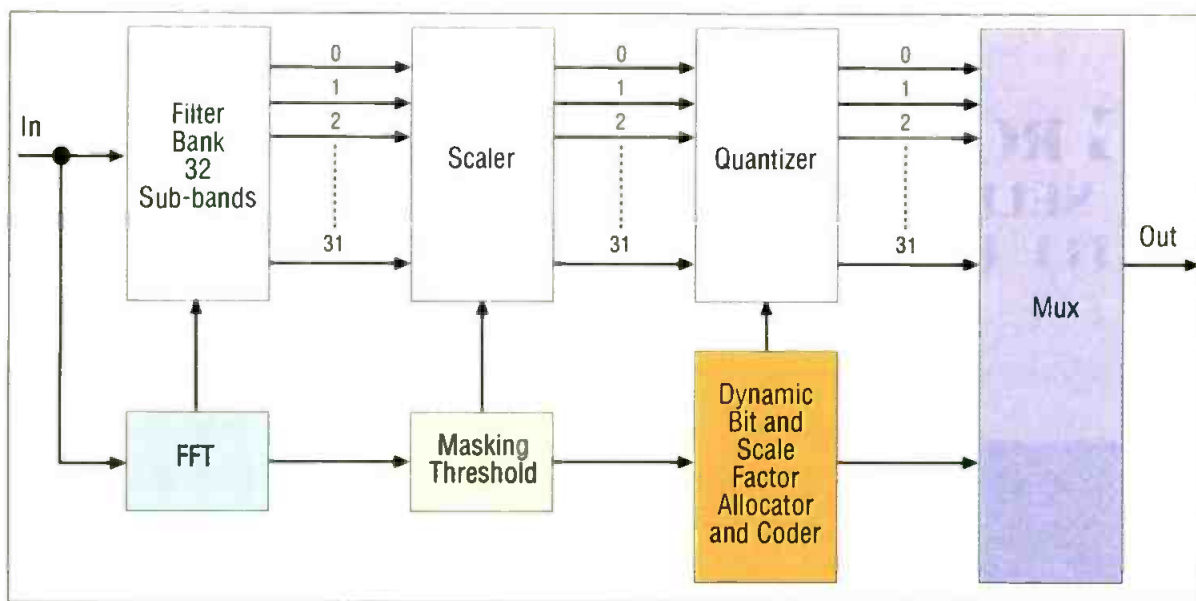


Figure 3. Simplified block diagram of an MPEG audio encoder. A filter bank splits the input signal into 32 sub-bands in an essentially lossless and reversible manner, while an FFT is used as the input to a masking threshold algorithm. The results are multiplexed and output.

as far above the noise level as is possible. The quantizer then allocates the available number of bits in a way that meets both the bit rate and the masking requirements. The information on how the bits are distributed over the spectrum is contained in the bitstream as side information.

The decoder is less complex because it does not require a psychoacoustic model and bit allocation procedure. The sub-band filter of Layer

I is also used by Layer II and Layer III. Layer II adds a more efficient coding of side information. Layer III adds a frequency transform in all the sub-bands. The three layers have been defined to be compatible in a hierarchical way, i.e. a full layer n decoder is able to decode the bitstreams encoded in layer n and all layers below n . Consequently, a full Layer III decoder accepts Layer I, II and III bitstreams and a full Layer II decoder

accepts Layer I and II bitstreams. Layer I decoders only accept Layer I bitstreams.

The first phase, MPEG-1, deals with mono and two-channel stereo sound coding, at sampling frequencies commonly used for high quality audio (48kHz, 44.1kHz and 32kHz). The second phase, MPEG-2, meets the needs of new

applications including a wide range of audio quality levels with data rates ranging from 32kb/s to 1066kb/s. This wide range is realized by splitting the MPEG-2 data rate into two parts: an MPEG-1 compatible primary bit stream (384kb/s for Layer II) and an extension bitstream. With Layer III at 64kb/s per channel, five independent full-bandwidth audio channels can be encoded within 320kb/s ($5 \times 64\text{kb/s} = 320\text{kb/s}$). Alternately six



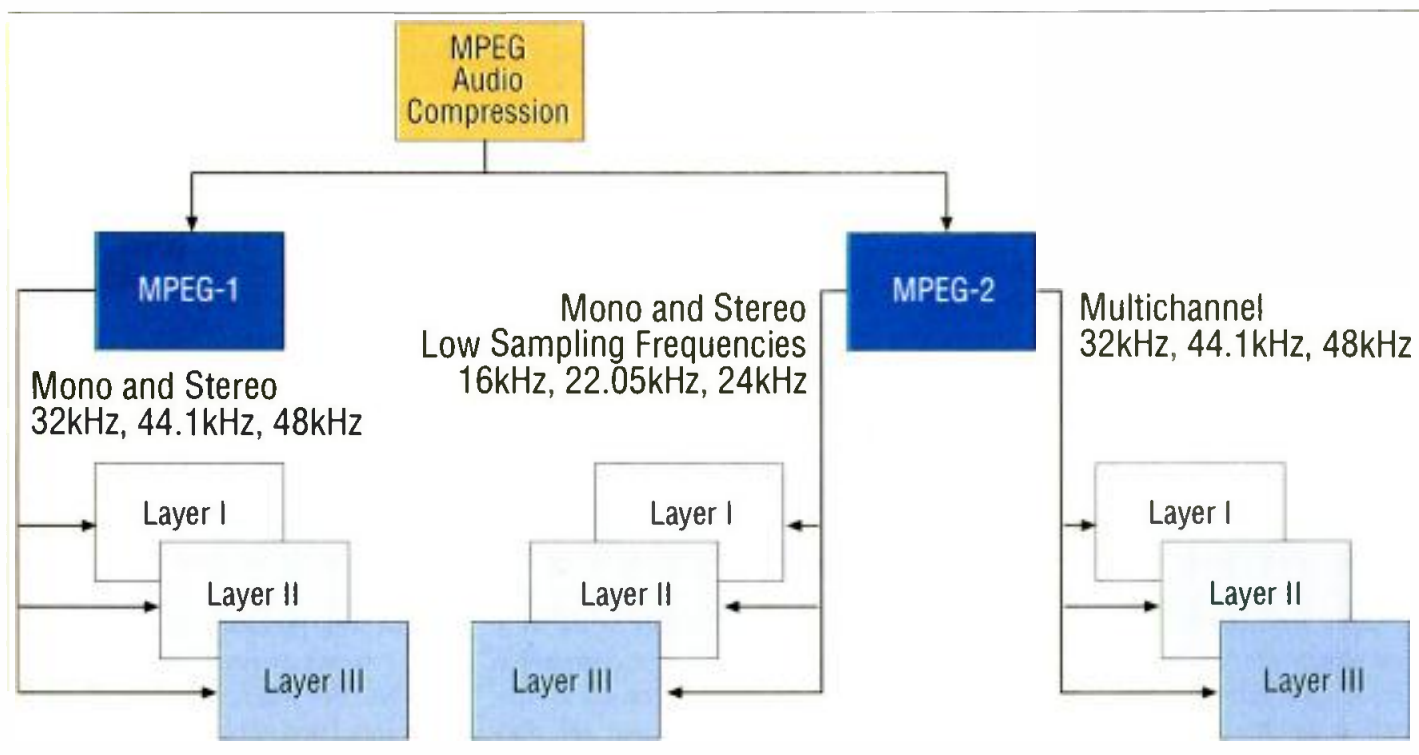


Figure 4. The MPEG audio compression family includes MPEG-1 and MPEG-2 specifications for Layer I, II and III coding.

audio channels, including a low-frequency enhancement channel (LFE), can also be carried to support multichannel surround sound requirements (5.1 audio). Additionally, extensions to lower sampling frequencies (16kHz, 22.05kHz and 24kHz) provide better sound quality at very low bit rates (below

64kb/s for a mono channel). Figure 4 summarizes the layers of MPEG audio coding. ■

Michael Robin, former engineer with the Canadian Broadcasting Corporation engineering headquarters, is an independent broadcast consultant located in Montreal, Canada. He is co-author of Digital Television Fundamentals, published by McGraw-Hill.



Send questions and comments to: michael_robin@intertec.com

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Maintaining software

BY BRAD GILMER

No doubt, maintaining your facility is one of the things you do best. As you go through maintenance checklists — cleaning transmitter air filters, replacing pinch rollers and calibrating scopes — consider adding a frequently overlooked category of equipment to your maintenance schedule: computers and the software that runs on them. Like most equipment, maintaining computer systems properly can help you avoid costly downtime and save you money.

Why maintain software?

The most compelling reason to maintain software is the same as that for maintaining hardware-based systems: without proper maintenance, the systems will fail. Another reason to maintain computer systems is to take advantage of new features that may be available free of charge. Finally, maintaining computer systems will keep you fresh and familiar with the systems themselves. If a system does fail, you do not want to lose valuable time looking for manuals, passwords and other essential information.

So, what needs to be maintained on a computer? Fans quit, floppy disk drives need occasional service and power supply cooling vents need to be cleaned.

Because many computers used in broadcast applications sit in racks unattended, these items can be easily overlooked.

Several years ago, I was called in to repair a critical automation computer system with a failed hard disk. The computer had been backed up religiously, so reloading software was not a problem. And, there were spare disk drives on the shelf. Unfortunately, things went downhill as soon as I tried to insert a boot disk into the floppy drive and found that the door wouldn't close. Inside was a fur ball big enough to make an Angora cat proud. Attempts to clean it out enough to make it serviceable were unsuccessful. (Later, we determined that the floppy disk had not been used in over two years.) The moral is: While it is true computers have very few moving parts, and those parts need only occasional maintenance, neglect can lead to major headaches.

By now, the need for computer hardware maintenance may be obvious, but what about the need for software maintenance? Some time ago, I was responsible for a critical piece of on-air equipment produced by a well-known manufacturer. Every once in a while, the equipment would throw up its hands, give a somewhat cryptic error message, and

fall flat on the floor. Doing this every month or two was inconvenient, but it did not pose a major risk to the facility. The system would be rebooted and there would be a search for something wrong, but nothing was ever found. Inquiries to the manufacturer yielded no results. No, they had never heard of this problem. Yes, we were the only people in the entire solar system experiencing difficulties like this. No, this was not covered under the warranty. I was not too concerned about the problem until a second system started experiencing similar symptoms. Now this had my full attention. Was it a virus? Were there defective connectors inside the machine that were starting to go intermittent with age? Bad RAM chips?

It was highly unlikely that the problem was a virus. This was a UNIX-based system and few viruses have been written for these computers. Also, these computers were dedicated machines with no connection to the Internet. Bad connectors generally do not get better on their own without some sort of physical movement. A simple reboot fixed the machine. As for bad RAM chips, there was never an error message even though countless RAM diagnostic tests were run. It turned out to be something fairly obscure called faulty pointer math.

These systems were on for months at a time. After performing millions of calculations, the machines would fail to properly clear out the stack space (a temporary storage location used in microprocessors for arithmetic calculations) for re-use. While the retained stack space was very small, cumulative errors in clearing the stack space caused the unclaimed area to grow. Eventually, the machine ran out of stack space, halting the system. Rebooting fixed the problem because the stack space was reset in the process — eliminating any long-term cumulative effects. People used to tell me that a system reboot was part of their regularly scheduled computer system maintenance. Although they did not know exactly why, this periodic reset



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Check mechanical items such as floppy drives, cooling fans, air inlets and mouse/trackballs.

Reboot and clean up unused files.



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seemed to make their systems run better. After this experience, I believed them. A regular reboot should be a part of any computer PM routine.

Periodically rebooting your critical computer systems is a good idea for another reason. The system can be programmed

temp files can cause your hard disk to become cluttered with useless files. Eventually, your system could fill up, causing slowed response as cache sizes reduce. Finally, this will cause the system to stop entirely. If the computer system is sitting in a rack, someone may not notice the disk

set temp=c:\temp or set wintemp=c:\wintemp

This command tells the system where to store temporary files. Note that you may have either, both or none of the lines above in your AUTOEXEC.BAT file. If neither of these commands is present, consider adding them. This allows well-behaved programs to store their temporary files in a common location rather than scattering them all over your hard disk.

Next, enter the following command into your AUTOEXEC.BAT file: if exist c:\temp*. * erase c:\temp*. *

This command looks for any files in the temporary directory. If it finds them, it deletes them. Another line can be added to the AUTOEXEC.BAT file for the wintemp directory if it is present.

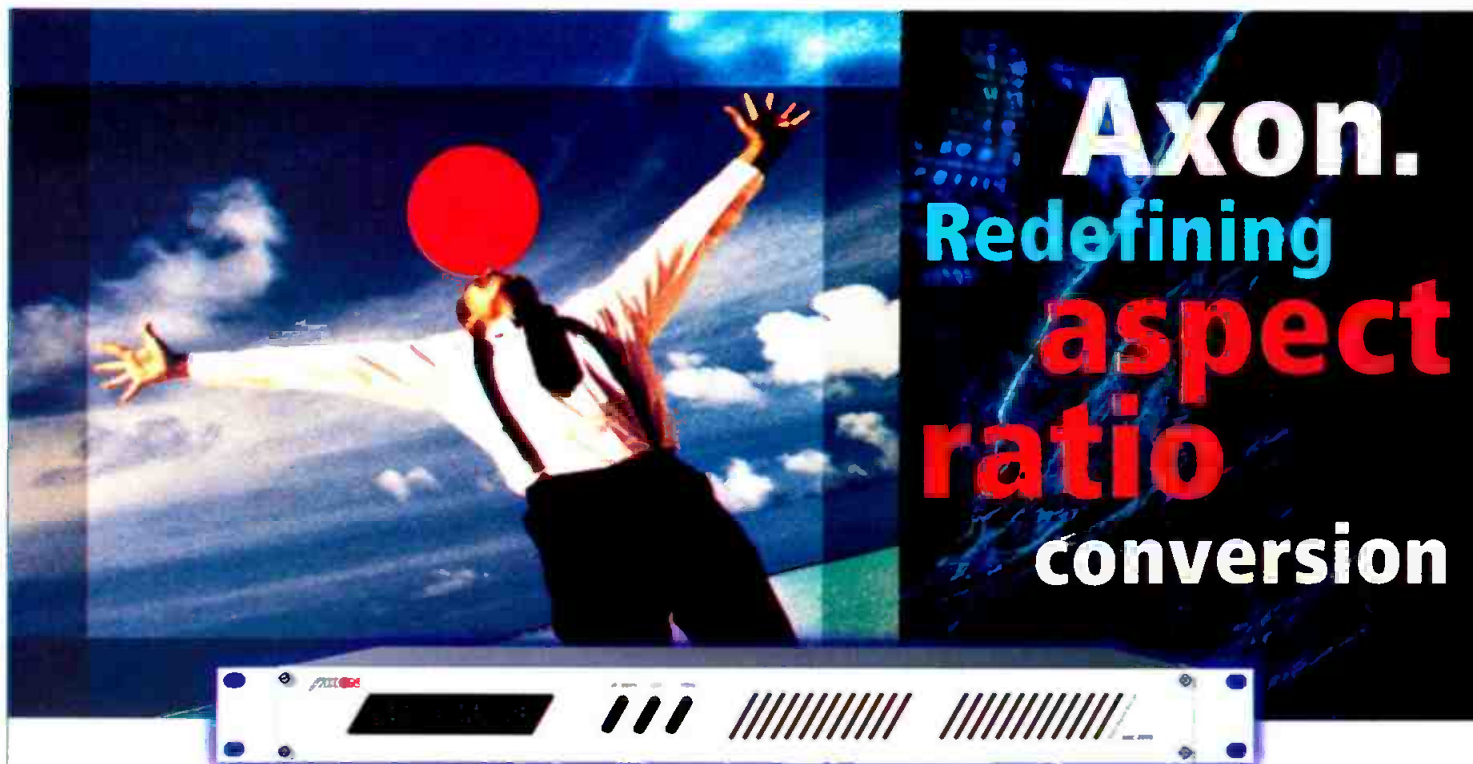
If you are responsible for maintaining a UNIX system, there are many other things that you may need to do to keep your system in top operating condition. Print queues, e-mail queues, various log files and other items can all grow out of control unless they are maintained properly. Fortunately, in the broadcasting environment,

Although computers have very few moving parts, and those parts need only occasional maintenance, neglect can lead to major headaches.

to automatically cleanup unnecessary files during the boot process. This is necessary because, as the computer performs its tasks, it frequently opens up temporary files. These temp files may or may not be deleted when a task finishes or when the system shuts down. This is especially true if the system experiences an abnormal shutdown during a power failure or forced reboot. Just as with the pointer math problem above, failing to clean up these

full warning messages until it is too late. A solution for Windows machines is to insert a simple command in the AUTOEXEC.BAT file to clean up these unnecessary temp files. The command will be executed every time the computer reboots.

To do this, first, look at your existing AUTOEXEC.BAT file. Look for a line containing an entry similar to the following:



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vendors resolve many of these issues. To learn more about maintaining these systems, there are a number of excellent books on UNIX system administration. The best book I have found on UNIX system administration is *UNIX System Administration* by D. Fiedler and B. Hunter, published by Hayden Books (ISBN 0-8104-6289-3)

Application software maintenance

Things can also be done to keep applications running in top form. Operating system software is not the only software capable of shooting itself in the foot through pointer math errors. Application software can be guilty as well. For that reason, regularly scheduled reboots are a must. Rebooting resets all the registers and allows programs to clear out any

Operating system software is not the only software capable of shooting itself in the foot through pointer math errors. Application software can be guilty as well.

faults or problems that may have accumulated over weeks of operation. In addition to an occasional reboot, it is wise to periodically check with the manufacturer to verify you are running the latest version of application software available. Many times, vendors will make upgrades available at no cost. These upgrades may also contain bug fixes that resolve system issues. The question of whether to upgrade a system and how to do it is not as straightforward as it might seem, especially with something as critical as an on-air automation system.

While vendors work very hard to be sure that their software is fully tested before it leaves the factory, it is possible that a product is delivered with a bug. For that reason, it is wise to install any new software revisions on a test system before putting the system on-line. In the case of automation systems, a bug may not be fully revealed without all peripherals attached. For most broadcasters, it just is not possible to have a complete master control suite and associated support equipment available for an upgrade test. In any case, it is best to perform as much off-air testing as possible before putting an upgrade on the air.

Many broadcast computer systems now are available with maintenance contracts. These contracts may be an excellent buy for stations that do not have the time, funds or personnel to maintain their systems. Let's face it — maintaining computer systems, especially those based upon UNIX or other non-WINTEL architectures require specialized knowledge. It may not be worth having someone on staff full time when these skills are only needed occasionally. For those with larger systems, however, it may be less expensive to have someone on staff than to contract for maintenance.

Brad Gilmer is president of Gilmer and Associates, a management and technology consulting firm.



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Comments on compatibility

BY STEVE EPSTEIN, TECHNICAL EDITOR

In July, I ran a letter from Leland Brun regarding problems he was having with machines based on the DV format. Since that article ran, my e-mail box has been quite full. The letters have touched on a variety of related topics including reader experiences, tips and lessons learned. Tape format wars within this industry go back almost to the beginning of tape recording. Maybe because of this history we tend to view minor squabbles as all-out war. The debate regarding the real compatibility of these various DV-based formats has yet to be resolved completely, but the following two letters shed a new and different light on the matter at hand:

As Panasonic's Tech Support Manager, I have received comments on various versions of this ongoing issue. Two years ago many of Mr. Brun's comments may have had some validity but these issues have all been resolved. Today, we are not experiencing any particular problems, and we speak with hun-

of oxide that appeared on surfaces the tape came in contact with. It was determined that the problem was related to an incompatibility in the tape lubricants used by each manufacturer. If used individually there wasn't any problem. Once combined, the two could interact and cause head clogging. It is said that Sony's lubricant formulation was developed to increase the time between head cleaning. It was apparently somewhat successful, but the byproducts caused other problems. It is interesting that in Japan the dealers were acknowledging the tape compatibility issue. Here in the U.S. the shortage of Sony tape was attributed to supply and demand.

Jointly, Matsushita and Sony resolved the issue and within a few months Sony released an improved formulation. Looking back, we have not received any calls on this issue for at least 18 months. I should also mention that the number of related incidents we did receive calls on were very few and could

format uses.

Tech Support has realized a trend in which as long as a deck is working, users tend to leave it alone. Maintenance is something you do when you develop a problem, and preventative maintenance is seldom practiced. Those users of today's digital formats who are concurrently using DVCPR0, DV, and DVCAM tapes in Panasonic machines, and who are delighted with the results, are the same customers who perform the recommended maintenance on their equipment. I sincerely hope this information would bring this matter to closure. Panasonic's Tech Support staff would also encourage any readers with related questions to contact us at pbtssupport@panasonic.com.

Bob Kozlarek

Tech Support Manager
Panasonic Broadcast & Television
Systems Co.
Secaucus, NJ

Today, we are not experiencing any particular problems, and we speak with hundreds of customers who are using both Panasonic and Sony products, interchanging tapes without incident. — Bob Kozlarek, Panasonic

dreds of customers who are using both Panasonic and Sony products, interchanging tapes without incident.

Approximately two years ago users of the DV format may remember a shortage of Sony DV tape in the U.S. Dealers stated the shortage was due to a supply-and-demand situation. About this same time Panasonic received a few calls from customers who were experiencing problems that appeared to be related to the combined use of Panasonic and Sony tapes in the same camcorder. The problem manifested itself as a brown smear

have been counted on one hand. As for Mr. Brun's comments on DVCPR0 decks playing DV and DVCAM, I strongly disagree. It is a known fact that DV tape will shed a bit more oxide than DVCPR0 and DVCAM tape. Accordingly, the heads and transport mechanism will require maintenance slightly sooner in any deck that would be using DV tape as compared to decks playing DVCPR0 and DVCAM tape. This has nothing to do with the inherent design or quality of each manufacturer's decks, but is related to the type of tape the DV

Regarding your July article, some questions and some comments came to mind.

The statement from Panasonic's field engineer, "Sony tape is so abrasive that you could only expect about 500 hours before the heads are shot," is an incredible statement. It is a rare occasion that I go to bat for a competitor, but if the ME tape manufacturing process were better understood by that field engineer he would surely ascertain that there is a major discrepancy in his statement.

Metal evaporated tape typically has such an incredibly smooth surface that a lubricant is required. This lubricant is applied during manufacturing following the passivation process. Without the lubricant, the performance of metal evaporated tape would be severely ham-

Continued on page 114

Sony Broadcast and Professional Group

SONY

Prepared by the editors of Broadcast Engineering

The NewsBase Server System.

Technology to Increase Newsroom Productivity



WPIX New York's newsroom, one of 15 Tribune Broadcasting stations that has selected Sony's NewsBase server system. WPIX's new system will include newsroom desktop editing.

The Sooner You Get the Pictures,

News is the driving force behind the successful television station of today. The real-time, no-fault, nature of news imposes unique demands on personnel, systems, and planning. In television, the need exists to bring a wide variety of divergent elements together at the right place, at the right time. It was within this framework that Sony's NewsBase™ Newsroom System was designed.



A Sony news specialist prepares a NewsBase system for Times Square Studios Limited, the future home of ABC's "Good Morning America."

What is NewsBase?

NewsBase is a nonlinear server-based news production system. It supports feed recording, editing, on-air playback, and newsroom desktop video browsing and editing.

Beyond the story of NewsBase lies a much larger issue: namely, what is the next step forward for newsroom automation?

In a busy television newsroom, ultimate efficiency and productivity is achieved only when three key elements or functionality are combined:

- Text search and editing
- Video search and editing
- Centralized server technology

With these key issues in mind, the NewsBase system was designed to provide these benefits:

- **Video on the desktop.** For too long, news production processes have made it difficult to match text and video.
- **No waiting.** Technology needs to make the process faster. Never force a user to wait for video to transfer from one place to another—not even if the transfer occurs faster than real time.
- **Incoming feed access.** As soon as feed recording begins, all users can view or edit the material within seconds.
- **Simultaneous access.** Many people can utilize the same material at the same time. Users simply access the material they want, directly from the server.

These features are important because they define how a modern newsroom should operate.

It is no secret that stations across the country—and indeed around the world—are being challenged to produce more material, of higher quality, with the same human resources. This task can only be accomplished with better tools. Such tools can erase technological barriers between the reporter or producer's idea of what a story should be, and the steps necessary to implement that vision.

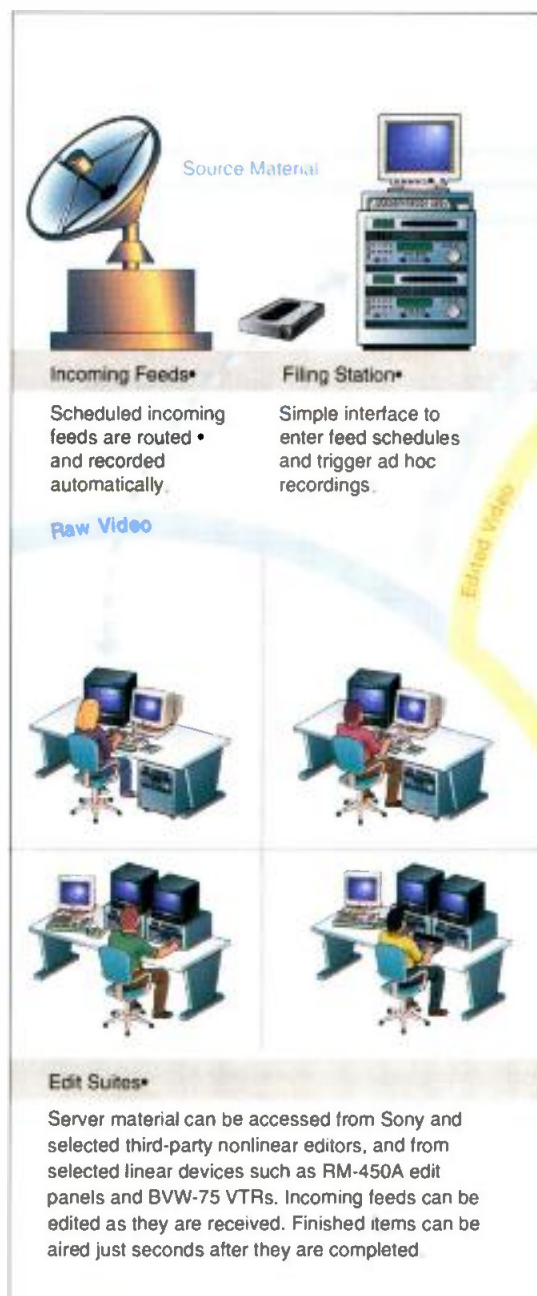
The Benefits

The unique approach crystallized in the NewsBase system makes two very important improvements on today's all-tape operation: it makes a news operation faster and it makes it better. Faster, because material can be accessed as it is received and then used simultaneously by different writers and editors. Better, because desktop editing makes it easier to match words and pictures.

It is an unfortunate fact of life that much of a journalist's valuable time is spent performing routine—even mundane—tasks, such as waiting for feeds, searching for tapes, and standing in line at an edit suite. This is the primary reason that the systems-wide approach to news automation is so important.

In the case of NewsBase, Sony's ClipEdit™ software enables producers, writers, and reporters to view video at their desktop, and if they like, to actually edit the material—from simple teases to reporter packages. Or "final polishing" can be left to an editor in an edit suite. Either way, reporters, editors and producers have the tools necessary to easily review the universe of material that is available so that truly the best shots (not just the easiest shots) can be selected. Furthermore, once selected, the system provides a platform that makes it easy to write to the video.

Editorial oversight is another critical item in any news opera-



the Better You Can Tell the Story

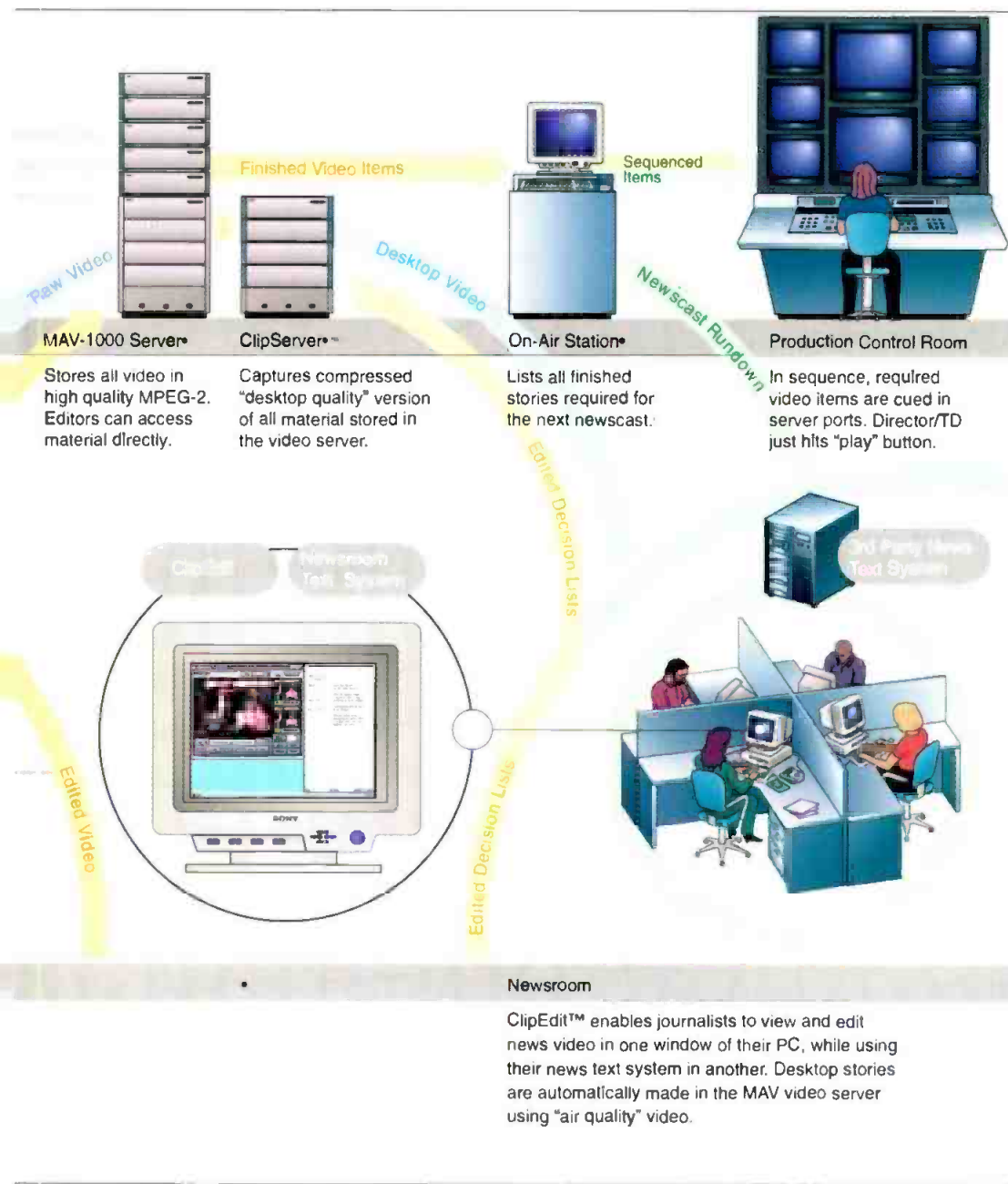


Figure 1 The core elements of the Sony NewsBase newsroom system.

tion. In today's newsroom, material is rarely screened by news managers or producers prior to air; it's just too difficult to do routinely. Fortunately, centralized technology offers a better alternative. The ClipEdit system makes it easy for executive producers to review material prior to air from any desktop.

Many news organizations have Internet services, and Sony's web publishing extension enables any desktop ClipEdit software user to send finished items to the newsroom's web server. Here again, the integration of many different—formerly separate—functions yields enormous returns in efficiency and creativity.

ClipEdit software is designed to integrate with any Windows NT® 4.0 newsroom computer text system. That means it is simple to write scripts in one window and view or edit video in another. Both systems automatically exchange rundowns and status infor-

mation. If the text system supports the emerging industry standard Media Object Server (MOS) protocol, it is possible to search for text and video items together in one integrated search from the text system. MOS is intended to be an open industry standard, allowing more complete integration between newsroom computer systems and media server devices such as still stores, graphics systems, audio servers, and video servers.

Desktop video editing will be as important to television news as desktop publishing has been to the design and production of printed material. In that industry, early adopters enjoyed a clear competitive advantage. Expect no less from television news, which has a history of redefining itself—thanks to new technologies.

How Does it Work?

All of the elements that make up a modern newsroom automation system are illustrated in the diagram shown in Figure 1 at left. To begin the process, a Filing Station triggers the recording of incoming feeds and tapes. As material is received, it is accessible within seconds to all users. Scheduled incoming feeds—and ad hoc tape and line feeds—can be automatically recorded using the Filing Station. One Filing Station can manage many operations simultaneously.

Users can access this new material from all edit suites and the newsroom. Editors can use traditional linear edit controllers or non-linear editors. No transfer time is required. Newsroom users can see and

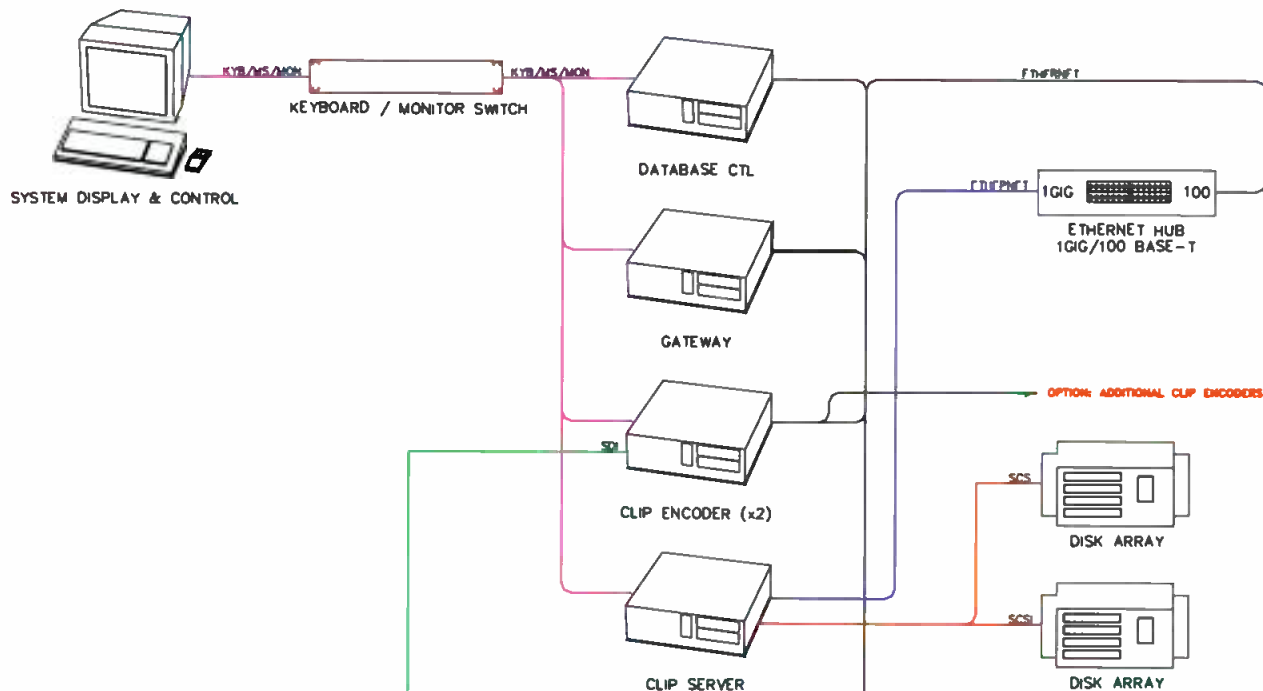
edit the video with ClipEdit.

The ClipEdit software application runs on the same Windows NT operating system that now supports most news text systems, which means that journalists can edit video and pictures on the same computer screen. Incoming feeds can be monitored (and edited) as they are received.

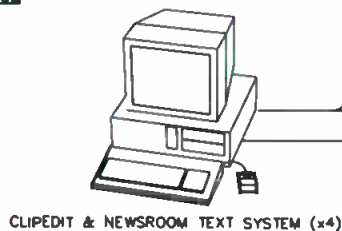
With the capabilities brought to the desktops of journalists by ClipEdit, there are no more excuses for not writing to video!

Whether on the desktop or in the edit suite, when users indicate their stories are complete, they can be aired in a matter of seconds. The On-Air Station automatically sequences the stories that are "next up." These pieces, automatically arranged based on the newscast rundown, are cued in server playback ports. The director can roll and take the ports just like a VTR.

CLIP SERVER / CLIPEDIT LAN



NEWSROOM



APPLICATIONS PC

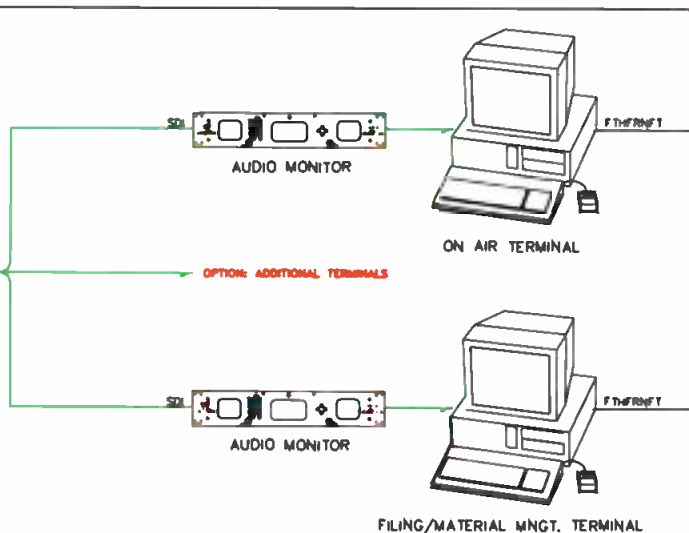


Figure 2 Sony NewsBase newsroom automation system overall conceptual diagram.

and efficient storage. Superb reliability is provided through the use of fault-tolerant, redundant, or hot-swappable components. Mirrored file management techniques also can be utilized.

Sony's server architecture consists of two basic units:

- The MAV-1000 controller
- MAV-S1010 RAID-3 storage units

Each MAV-1000 controller can be configured with up to eight SDI input/output ports, or up to six SDI input/outputs, and one SDTI port. Transfer speeds up to four times faster than real-time are available using SDTI. MAV-S1010 storage units provide 23 hours capacity.

Frame-accurate, real-time control of the MAV units is managed by Sony's Server Management System (SMS/GW) and Intelligent Device Controllers (IDC). Signals are switched via SDI/SDTI digital routers. This assures delivery and enables faster-than-real-time transfer of material.

ClipEdit/ClipServer software is included in all NewsBase systems. The basic package enables two simultaneous Clip system inputs and four user seats.

Edit Suite Options

Sony's NewsBase server system brings two key benefits to edit suites:

- Users in different suites can access the same source material simultaneously.
- Users can start editing from source material as it is being received at the station—no more waiting for the feed to end.

These benefits can be realized with or without changing from today's linear editing interfaces to nonlinear systems.

Nonlinear Editing

A nonlinear editing system brings enormous flexibility to any newsroom operation. The full capabilities, however, typically have not been realized in a stand-alone situation. Integration with a server is the key to productivity.

The Sony DNE-1000 enables editors to immediately access material in the NewsBase server system. While a fast (4x) download mode is available, such transfers are not required.

For late arriving tapes, the DNE-1000 supports Sony's "linear-like" mode to edit directly from tape to disk without download. The DNE-1000 can be configured to include A/B roll effects and downstream title keying. All effects in the DNE-1000 are processed in real-time, so there is no need to wait for results before continuing to work.

The DNE-700 offers cost-effective nonlinear editing by simultaneously utilizing the tape and disk drive inside Sony's DNW-series hybrid recorders. Its linear-like mode enables placing shots from tape directly on the timeline, without first downloading. Alternately, users can opt for material acquired on Betacam SX tapes to be transferred to disk storage in a faster-than-real-time mode.

Using either editor, finished stories can then be transferred back to the server and begin playing to air seconds after the transfer starts.



For greatest versatility, conventional linear editing controllers can be used with the NewsBase news server system, as illustrated here with the Sony RM-450A.

Linear Editing

Installing a video server does not mean that an immediate change in edit suite equipment is required. The integration of the NewsBase server with a linear editing system offers significant advantages in workflow, expense management, and training. The linear editing element is significant for a number of reasons, including the following:

- It gives stations important implementation options.
- It lowers the entry price of a NewsBase system.
- It enables a customer to control when—and if—new tools and new control surfaces should be brought into the edit suite.

It has long been recognized that the user interface is one of the most important features of any product. In the case of a newsroom operation, a familiar interface is critical because of the tight time limits typically imposed on editors and journalists. Therefore, the ability to use familiar tools with the new technology of video servers is an important feature. The RM450A, for example, is one of four traditional devices that work with the Sony NewsBase system (other devices are the FXE-120, and front panel VTR editing with a BVW-75 or DNW-A75). This linear editor-to-server link enables many—perhaps most—of the benefits of owning a NewsBase system to be realized without changing the work style in the edit room.

In this application, users select the source file they want from a PC in the edit suite. When selected, RS-422 control, video, and audio are automatically routed from the server to the edit system. The server appears just like a VTR on the Play side of the edit controller. Users edit from server to tape. When complete, the tape can be transferred back to the server and begin playing to air in seconds.



Powerful editing capabilities are realized when the Sony DNE-1000 is incorporated into the NewsBase system. Shown here is TXCN, Belo's 24-hour Texas statewide news channel.

onds, regardless of the item's length.

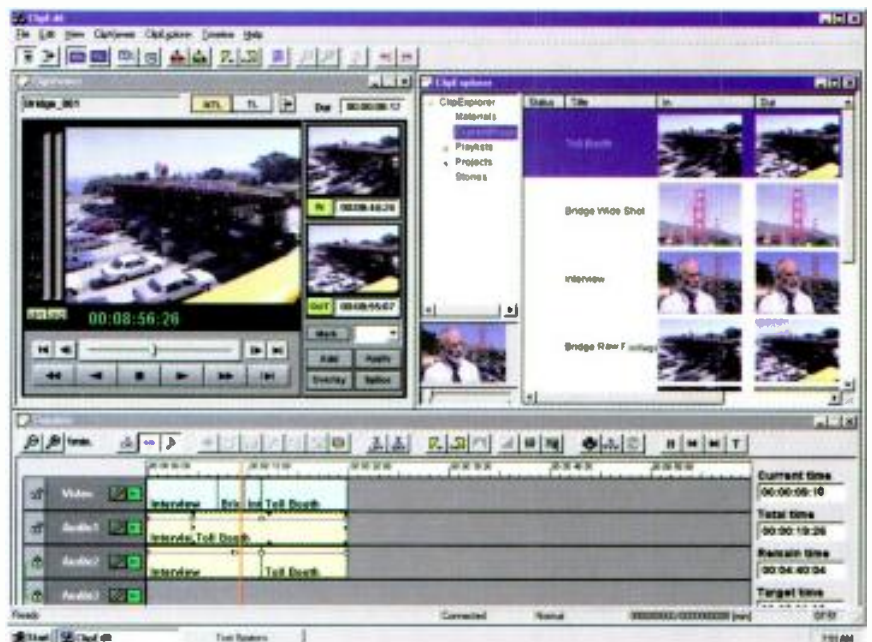
Apart from the benefits of familiarity, this approach is valuable because the source material from the server is instantly available. For example, for a feed that is coming in live from the scene of an event, there is no need to swap tapes or wait until the feed is concluded before beginning to edit the story. This capability eliminates a significant bottleneck for coverage of breaking stories. Furthermore, the file is available to multiple users at the same time. Everyone who needs the material can get it simultaneously, and they can do it without changing the control surface or learning how to work a nonlinear editor.

The linear editing approach, therefore, offers a number of valuable capabilities for stations that do not want to move to a nonlinear editing system in one step. By using such a staged approach, stations can phase-in the purchase of editing equipment and—equally important—phase-in all the training required for staff members.

The training issue is important for any business, but in the news business, it is critical. The time-sensitive nature of television news makes it imperative that any newsroom automation and editing system integrate seamlessly into the operating routine of the station. A phased approach to introducing nonlinear editing allows for a smooth transition, and ensures that the newsroom staff will concentrate on getting their news programs on the air—not on learning how to operate new devices and systems.

Newsroom Desktop Video

The ClipEdit software package brings powerful editing capabilities to the journalist's desktop. The user interface is intuitive and it runs on a standard PC. When integrated with a newsroom text system, consider-



ClipEdit software is a video viewing and editing tool made for news writers and producers. Select any file and it pops into the viewer window where it can be viewed with VCR-like controls on the same PC as the newsroom text system.

able gains in efficiency and final production quality can be realized.

The ClipEdit system's user interface is designed for news writers and producers, not editors. While the interface is sophisticated enough to cut a reporter package, it is intuitive enough to enable any newsroom hand to cut a voice over or tease without formal training. Even if used only as a means of viewing material, ClipEdit makes it easier to match video and text.

All material edited using the low-resolution ClipEdit software is automatically ready to air in the main server system. Regardless of where material is cut, news managers can screen all material prior to air, from any ClipEdit terminal.

NewsBase Select™ Systems

Configuring a NewsBase system is not a science project. Sony can simplify the process with its Select Systems service.

The concept of the Sony Select System is simple: take the complexity out of purchasing and installing the highly sophisticated NewsBase production system. Sony minimizes the costs of up-front engineering and system integration, and takes responsibility for installing, testing and commissioning the new system.

Everything about the system is pre-planned. Customers select the basic system size and consider several optional features. Racks are pre-designed. Software is pre-loaded. The system is pre-assembled and pre-checked by Sony engineers in the company's own state-of-the-art systems integration facility. Then, it is installed on the customer's premises and checked again. Sony provides convenient I/O panels to easily connect the NewsBase system with the existing station router, news editors, and newsroom LAN.

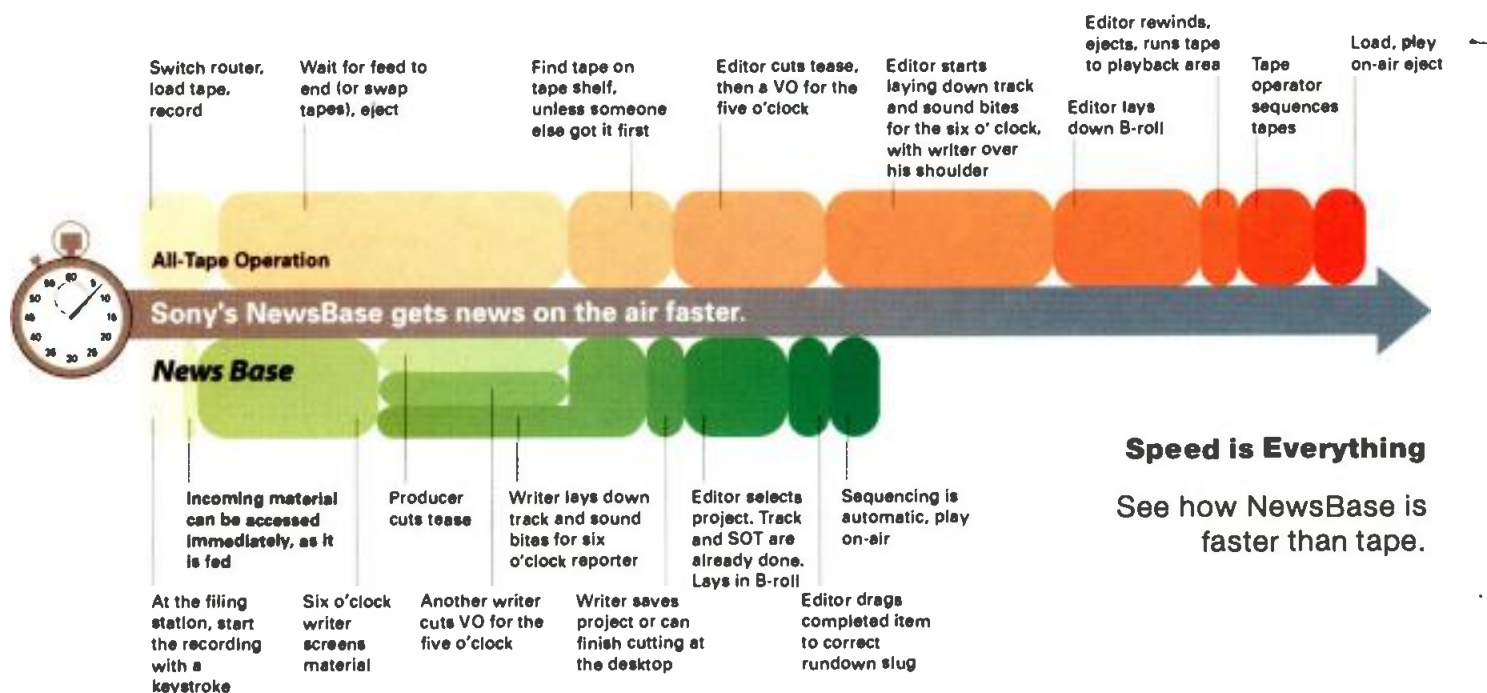
Sony does everything necessary to ensure that the sys-

5 in/out ports	6 ports	8 ports	16 ports
23 hours on-line storage	23 hours on-line storage	23 hours on-line storage	46 hours on-line storage
Filing, on-air, and material management user applications All NewsBase hardware and software All ClipServer/ClipEdit software Newsroom text system interface On-site commissioning and training One year 24 x 7 SupportNet service coverage			

NewsBase options and capabilities. Larger systems can be configured to meet specific needs as custom system integration projects.

tem is up and running quickly, easily and on schedule. This commitment includes on-site operator training, plus a full year subscription to Sony's SupportNet™ 24-hour customer support.

Typical configuration options are listed in the accompanying table above.



Here's an example of cutting a VO for the five and a package for the six o'clock news.

NewsBase: On the Air Around the World

NewsBase systems have been selected by many U.S. and worldwide customers. Systems marked with † are being installed or are soon to be installed.

WSB Atlanta
Texas News Channel
Texas Cable News
KHON Honolulu
Times Square Studios Ltd. New York
WXMI Grand Rapids
KDAF Dallas

KSWB San Diego
Turner Sports, Atlanta†
WPIX New York†
KTLA Los Angeles†
WGN Chicago†
CLTV Chicago†
KWGN Denver†

TV Globo, Brazil
Televisa, Mexico
Reuters, UK
RAI, Italy
TeleMadrid, Spain
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NHK-I, Japan
Iwate Asahi, Japan
TV Asahi, Japan
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SYSTEMS DESIGN SHOWCASE

TXCN goes digital

Texas Cable News' digital newsroom provides 24-hour statewide news-on-demand with the help of Sony's MAV-1000 servers, DNE-700 nonlinear editors, Avid News and Sony DVS-V5454B digital routing switchers. Photo by Concept Benson & Rice.



By Tom Matasso

TXCN (Texas Cable News) in Dallas is one of the first news operations in the country to adopt server-based digital technology through out the entire production and broadcast process.

Drawing upon resources of the four Texas stations owned by the Belo Corporation, as well as satellite feeds from major networks and TXCN's in-house production facilities, the station provides state-wide news, weather and business reports of interest to local and state viewers around-the-clock, seven days a week.

At the hub of TXCN's operation is Sony's NewsBase news production system. Thanks to the flexibility of its central MAV-1000 server and software, the station doesn't record complete half-hour news shows. Instead, segments are recorded that make up shows, which allow updating as necessary. That way the content of an individual story

SYSTEMS
DESIGN
SHOWCASE

EWITNESS NEWS 5

DIGITIZING WLWT-TV

WLWT's news studio was designed with widescreen production in mind.



By John Duggin Sr.

WLWT, Channel 5 in Cincinnati, is one of the most historic TV stations in the U.S., emanating from the golden days of radio. WLWT's first owner, The Crosley Broadcasting Company, was a prolific producer of live local programming through the 1950s, 1960s and 1970s.

DIGITIZING WLWT-TV

ing and stays digital until it arrives at the analog transmitter. The terminal equipment chosen to execute these conversions includes Leitch's 6800 series and Digital's DPS-470. With this equipment, the station's outside analog sources (NBC, news feeds, satellite feeds of syndicated product, etc.) are brought into the plant and concurrently synchronized to the WLWT plant, converted to digital and put as a source on the Philips 360Mb/s router.

WLWT selected Panasonic DVCPRO as its digital videotape format, using DVCPRO-25 for newsgathering and editing and DVCPRO-50 for program store-and-forward, production and promotions production. The decision on newsgathering equipment was made after several months of comparing DVCPRO equipment to the station's existing Beta SP equipment. Key criteria included picture quality and signal durability during the news transmission and editing process, equipment durability, small tape size and the desire of the news shooters for a physically smaller format.

The Philips Diamond Digital switcher, Pinnacle Devious DVE and still store expedite newscast production, long WLWT's market forte.

Decisions on lighting, look, and investment in new newsroom camera equipment involved several factors. DST assisted with the technical aspects of achieving a cost effective, yet high-end look, by providing an energy-saving Strand-Century lighting system. The system combines quartz key and cold cathode flat fixtures, providing the best available look for station news talent while minimizing the heat generated in the studio; consequently, the air conditioning energy bills are lower. The long life of the cold-cathode bulbs is also a plus.

While the station did not invest in expensive, high-definition cameras to prepare for HD format, WLWT did consider widescreen format in its newsroom studio design. WLWT can easily make the transition to future formats without having to remodel its facility extensively.



Included in WLWT's rack room are Panasonic DVCPRO decks for recording and playback tasks.

Staging

After configuring and planning the entire technical basis and equipment components of station operations, DST took the paper design, assembling and evaluating them at its own facility. By recreating WLWT's rack room, DST evaluated the wiring layout and tested the system. Changes and testing occurred before installation at the new facility. DST built each island on palettes and shipped them to the station.

Prebuilding the station's custom islands simplified the moving schedule and eased the transition to the new facility. It not only helped in the installation by pre-establishing the exact floor plan, but freed up workspace at the new facility as workers scrambled around during final stages of completion.

The completed WLWT facility is the final step in making a full transition to digital. WLWT purchased and installed an Iteco T603WN 7.5kW solid-state UHF DTV transmitter in early 1998. WLWT-DT began transmissions last

February on channel 35. An SD digital signal has also been transmitted since early February 1998, using the Philips TokenMux encoder to drive the transmitter. This transmission provides an ERP of approximately 65kW (average, maximum main-lobe) effective radiated power from the existing WLWT tower.

In its conversion and upgrade to DTV, WLWT worked carefully with DST to design and implement a configuration that would embrace any of the possible format combinations at minimal cost. Issues of intermixing picture format at the time of transmission are yet to be resolved by any network, broadcaster, equipment integrator or equipment manufacturer. However, WLWT prepared itself for online by integrating the most appropriate tools and is in place to be in the forefront of U.S. DTV stations.

John Duggin Sr. is president of Digital System Technology.

Design team, WLWT

John Duggin Sr., DST president
Dwight Crumb, DST design engineer
Janet Crumb, DST project coordinator
Richard Lohmueller, WLWT design engineer
Cindy Hutter, WLWT design engineer
Martin Faubell, Hearst-Argyle representative
Jerry Dixon, Hearst-Argyle representative

Equipment list

Ikegami monitors
Telex/RTS intercom
Louth automation
Wheatstone TVS 1000 audio console
Philips DD30 production switcher, Saturn master control, Venus routing switcher, Media Pool
Tektronix test and measurement
Chyron iNFiNiT!
Leitch terminal equipment
Miranda terminal equipment
DPS 465 frame synchronizers
Snell & Wilcox HD upconverter
Panasonic DVCPRO studio decks
ADC patchbays
Pinnacle DVE



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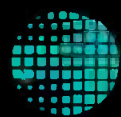
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Winterizing the antenna site

BY DON MARKLEY



Before the nastiest of the nasty weather arrives, it would behoove one to visit the tower and associated goodies again. First, it is a nice place to go to get away from the telephone and, second, there are some things that need to be checked while work can still be reasonably done. The most obvious is the coolant for those who have liquid cooled systems. While it is probably checked regularly and tested semiregularly, it can always benefit from one more careful check before facing the possibility of freezing. Verify there is an adequate supply of the chemicals of choice (for the transmitter, not the staff) on hand to cope with any unexpected catastrophic leaks. Check the pumps again, along with any associated filters for both liquid and air and, again, check for spares.

De-icer checks

Now, on to the fun stuff. Many stations have antennas equipped with de-

icers. Somewhere, there should be a record of the line current when the de-icers are energized. The de-icers should be turned on and the currents remeasured to ensure that all elements are somewhat intact and working. If no

At the same time, a good check of the overall physical condition of the tower is in order. One last check now can avoid nasty work when the temperatures are unpleasant, as well as that situation's attendant higher service rate.

A wide crack indicates the existence of a real structural problem that the average station engineer is totally incapable of dealing with.

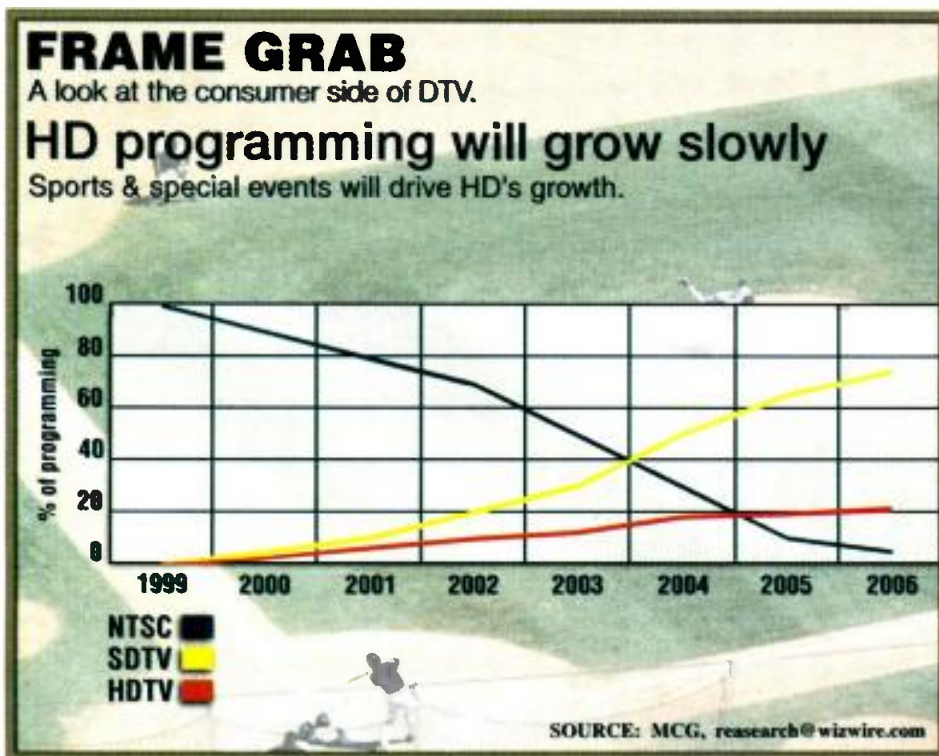
data is available, a check by your tower crew du jour would be in order. This should be accompanied by current measurements to establish the correct values. Of course, the tower crews can only do this when the antennas are turned off to avoid violating a whole bunch of FCC and OSHA standards. Any tower man worth his belt can quickly determine if a heater is working by a simple touch.

Particular attention should be given to dish alignment and mechanical condition prior to the high winds that accompany winter storms.

Back to the de-icers. A clip-on ammeter will yield an accurate check of each phase current to the elements. Besides, ammeters are fun to use because you are measuring variables that can be understood in real terms rather than the more exotic values used in solid state electronics. If the station has an automatic system to energize the heaters, they probably don't work given today's state of maintenance. Heaters can be a little tricky to test because one can't easily supply a source of freezing rain. This might be a good time to drag out the instruction book and review the testing procedures.

Tubular troubles

One little characteristic of some towers can present a nasty surprise. On towers with tubular steel legs, some manufacturers used bolt plates that are open in the middle, causing a very tall open area to exist inside each leg for the full length of the tower. Over the years, condensation causes water to form inside the legs, which will, naturally, accumulate at the bottom. On such towers, a weep hole is provided through the



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steel at the bottom of each leg to allow such moisture to drain out. The hole can be plugged by bug nests or by an accumulation of rust. If this happens, the water will freeze when the weather gets cold and split the steel tubing like a cheap pair of size small pantyhose on an extra large leg. The solution is quite simple: regularly clean the weep holes with a piece of wire so they can drain freely.

If such a leg split does occur, it does not necessarily mean total ruin. The split may appear as a very narrow crack, looking almost like a hairline running down the leg. In such a case, get a structural engineer to direct the welding of a reinforcing piece over the split. If the crack is gaping wide, run. A wide crack indicates the existence of a real structural problem that the average station engineer is totally incapable of dealing with. Structural work, including immediate action to reduce the loads on the leg is in order and must be done as soon as possible. Otherwise, there is a definite risk of tower failure. Explain that one to the front office.

Obviously, if your tower uses solid steel legs, the problem won't exist. An-



In addition to the tower, there are numerous other items such as outdoor heat exchangers, generators and the generator's fuel supply that all need to be readied for the cold weather ahead.

other problem with hollow steel legs is that they can rust out from the inside. Most reputable manufacturers galvanize both the inside and outside of the legs. However, in years gone by, that was not always the case. Some manufacturers plugged the ends of the legs before they went to galvanizing to save

material. While the legs may not be open all the way to accumulate sufficient water for splitting, they will rust away at a significant rate. The first indication of this can be the appearance of holes, usually at points where welding may have reduced the thickness of the steel slightly. This should be checked carefully. Unfortunately, the fix for the problem is not simple or

cheap. If the legs are rusting out from the inside, it's time for total replacement. Again, a planned voluntary replacement is vastly preferable to the alternative.

If rusting is encountered, an experienced structural engineer should immediately evaluate it. He should be able to determine the urgency of required replacement. This problem is most common in the areas where there is a lot of moisture in the air, such as on the coasts, but can occur in dry areas as well. It is much nicer, although more difficult, to find this problem while the tower is in its normal position, rather than inspecting the tower sections after they have come into the transmitter building to get out of the weather. ■

Don Markley is president of D. L. Markley and Associates, Peoria, IL.



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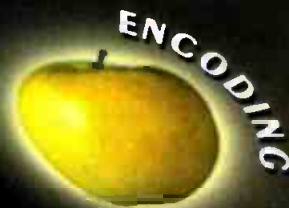
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Recording in stereo with a single microphone

BY ALLAN SOIFER

Much has been written about stereo microphone techniques. It seems that every generation of engineers and producers brings about some form of change – usually a repeat of or slight modification to existing methods. However, the live recording (in stereo) of classical music presents some interesting challenges. Ottawa recently hosted the annual Ottawa Chamber Music Festival, the largest of its kind in the world. The goal was to capture a number of performances for archival purposes and to enable the players, producers and technicians to fine tune their styles toward successful broadcasts of the event on TV, radio and the Internet.

The festival hosted a variety of chamber music styles, from amplified avant-garde groups to traditional ensembles. In all of these concerts, the intent was to be as unobtrusive (both aurally and visually) as possible and to capture as much of the live essence of the concert as technology permits without resorting to multimic and multitrack techniques. Ultimately, the varying venues, mostly church halls and sanctuaries with lots of reverberant ambience narrowed choices of recording styles to coincidence stereo technique.

The festival presented several unusual scenarios. Not only were the musicians spread widely on stage, but several pieces during a particular concert also required playback support loud enough to impact upon the audience but not so loud as to overpower the live players. The solution was to use a single, coincident stereo condenser mic (M-S format) positioned somewhat nearer to the musicians, and use amplified tripod-mounted loudspeakers for the playback. The speakers were positioned in such a way as to play off the bounce of the walls of the concert hall.

The classic problem with multimic placement for stereo broadcasting (A-B, ORTF and the like) is the phase imbalance (flanging and cancellation effect) when the signal is received in mono format. Too many mics equal lots of panpots and too much twiddling for the engineer — who is generally not a classical musician with full understanding of the composer's orchestral intent. The coincidence stereo technique relies on two microphone capsules that are placed

type of mic uses a matrix, either transformer, internal summing amps or both, to create a stereo signal (front plus side = left, front minus side = right).

The matrix makes use of the phase cues between the center and the surround mic capsules to produce broadcast-suitable stereo, which is fully mono-compatible. This matrix technique is popular when recording live dialogue for sitcoms and dramas, so that mono reproduction can be had for both editing purposes and to

avoid alienating viewers who do not have stereo TV reception available.

Figure 1 shows a typical ensemble on a church platform about two feet above the floor. The M-S mic was boomstand mounted with an appropriate shock mount for isolation. The approximate positioning was three to five feet in front of the most forward-sitting musician, and

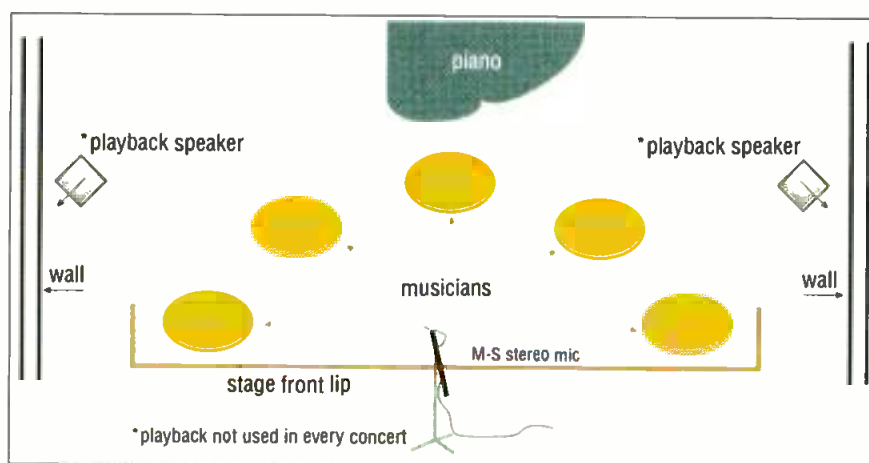


Figure 1. The M-S microphone positioning method places a single condenser mic close to and above the musicians. Where needed, playback support can be gained by using loudspeakers angled so that the sound bounces off the venue walls.

in or very near the same point, eliminating the phase relationship problems. The best known examples of this method are X-Y stereo, M-S stereo and Blumlein stereo. The X-Y method is difficult because two identically matched cardioid mics must be used with a specialized mechanical mounting bar. One variation on X-Y, which requires the necessary height for rigging, is to place two small lapel-type condenser mics 12-15 inches apart and 15 feet above the musicians.

Blumlein stereo uses two bidirectional mics, which unfortunately includes a great deal of room ambience — not at all suitable for this project. The M-S method uses one mic body, with a first-order cardioid capsule facing front, and a bidirectional capsule oriented 90°, looking left and right immediately behind. The extreme proximity of the two transducers negates any time/phase differences. This

about three feet overhead, looking down at about 45°, pointing toward the mid-point of the arc. The exact centering of the mic was determined by which instruments were being used. The M-S technique provided excellent room tone and audience response, and good levels without sacrificing correct orchestral (aural) placement.

The resulting sound (captured in RDATE format) was warm, airy and very lifelike in the playback. Multimic technique is fine for the studio or where there is an experienced conductor or leader who can make subjective judgments regarding balance and aural imaging. The purist approach of one stereo mic sometimes proves more worthy than a more intensive hands-on approach. ■

Allan Soifer is an independent audio recording engineer in Nepean, Ontario, Canada.



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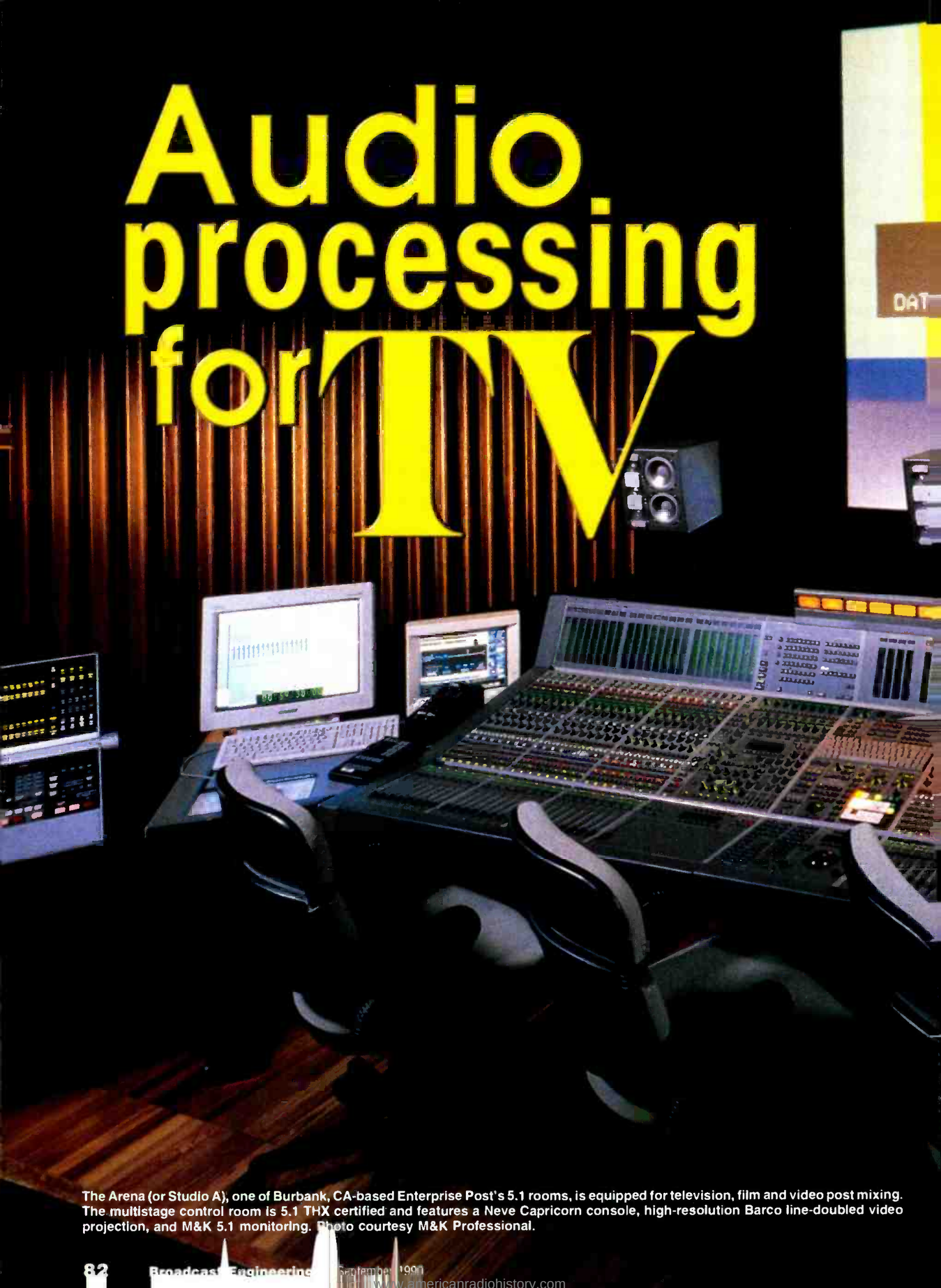
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Audio processing for TV



The Arena (or Studio A), one of Burbank, CA-based Enterprise Post's 5.1 rooms, is equipped for television, film and video post mixing. The multistage control room is 5.1 THX certified and features a Neve Capricorn console, high-resolution Barco line-doubled video projection, and M&K 5.1 monitoring. Photo courtesy M&K Professional.

By Robert Orban

With the assistance of Dolby Laboratories, Orban has developed a unique and effective approach to audio processing in a DTV plant. This new system will ease the integration of local and network two-channel programming, and fully exploit the extra features offered by the Dolby Digital (AC-3) system for 5.1-channel programming.

There are three important pieces of metadata in the AC-3 bitstream:

- Dialog normalization, which, in essence, sets the receiver's volume control to complement the dynamic range of the program material being transmitted.
- Line-mode dynamic range control, which allows the receiver to perform a wideband compression function if the listener chooses.
- RF-mode dynamic range control, which applies heavier processing.

The question that arises is how are these signals to be generated in a real-world operational facility, and, indeed, in which situations should they be generated.

The marketing landscape is littered with features that seemed to be a good idea at the time but proved to be of little or no interest to consumers. CDs have always offered the ability to deliver auxiliary data. According to the original CD hype, consumers were supposed to see the lyrics of the songs scroll by as they played them and they would see still pictures of the band members by connecting their CD player to their television set. Where are these features now? The answer, of course, is that the public did not find them compelling enough to justify the additional production expense to add them to the CD datastream or to justify the increase in manufacturing cost necessary to add video outputs or LCD screens to the CD players.

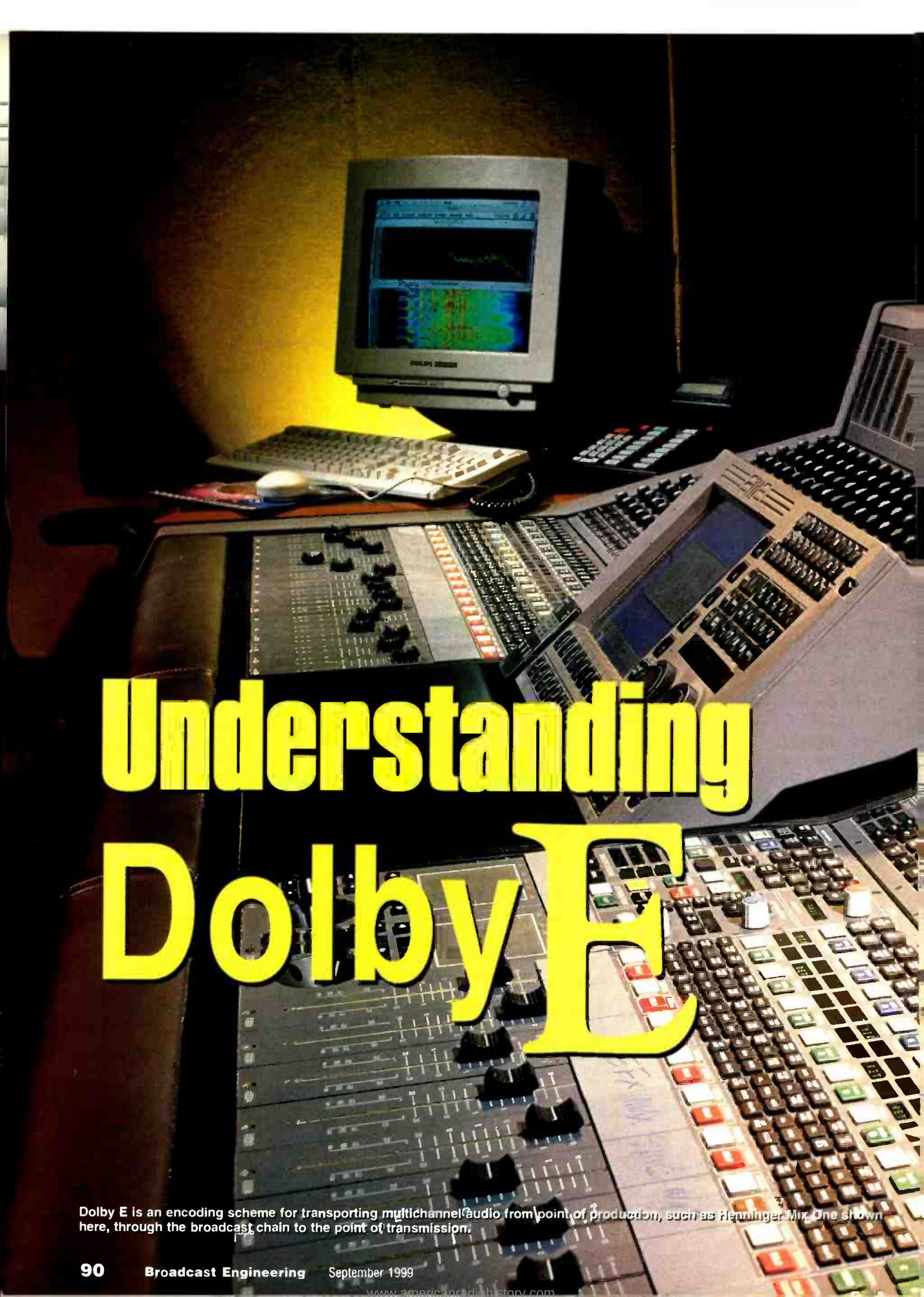
Another example is the SAP channel in BTSC stereo television. Very few viewers understand it, yet a number of them manage to turn it on by accident. They then can't understand why the sound becomes low-fidelity mono — and why everyone suddenly speaks Spanish. Consequently, many consumer manufacturers bury the SAP control very deep in the menu structure of receivers or VCRs to prevent this confusion from occurring in the future.

With regard to the Dolby Digital metadata, Dolby Laboratories specified that dynamic range compression would be the receiver default, because they realized that most consumers would never want full dynamic range audio. Dolby did leave the option for this default to be modified by those who do desire full dynamic range.

Experience shows that a vast majority of viewers want two things. First, dialog should be comfortably intelligible, and second, commercials should not be irritatingly loud in comparison to program material.

Home theater owners may want the opportunity to watch feature films while hearing a wide dynamic range signal. However, even these viewers usually consume television in a much more passive way when viewing garden-variety programs. If television is to be an acceptable part of the domestic environment, then sound cannot overwhelm nonviewing household members (not to mention neighbors, particularly in multifamily dwellings). For a variety of reasons, the dynamic range of sound essential to the intelligibility of the program should not exceed 15dB in a domestic listening environment. Underscoring and ambient sound effects will, of course, be lower than this.





Understanding Dolby E

Dolby E is an encoding scheme for transporting multichannel audio from point of production, such as Henninger Mix One shown here, through the broadcast chain to the point of transmission.



By Stephen Lyman

The ATSC audio system allows listeners to tailor the presentation of the audio portion of a program to their specific requirements. Some may want to hear programs that originate as 5.1 channels in that format; others may want or be restricted to a stereo or even a mono presentation by their receivers or environment. Some listeners will want the full original dynamic range of the material; others will need a lower dynamic range version that does not disturb light sleepers. The existing signal distribution infrastructure upstream of the transmitter does not meet the needs of a digital television broadcasting system. It would be very difficult to replace the existing two-channel audio infrastructure with a system that could handle the required number of channels and the metadata. It might be possible to enlarge an audio router, but other plant equipment cannot be expanded to handle the necessary six or eight audio channels and the metadata. The same applies to interfacility links because of limited spectrum availability or the cost of leased facilities.

Dolby E is a new multichannel audio bit rate reduction system that is designed to tolerate the multiple encoding and decoding operations required by contribution and distribution systems. It encodes up to eight audio channels plus the necessary metadata and inserts this information into the "payload space" of a single AES digital audio pair. The metadata is multiplexed into the compressed audio stream; it stays in sync with the audio and can be switched with it. Because the AES/EBU protocol is used as the transport mechanism for the Dolby E encoded audio, digital VTRs, routing switchers, DAs and any other existing digital audio equipment from the point of production to the input of the Dolby Digital encoder at the transmitter can now handle multichannel programming.

Understanding Dolby E

Metadata parameters

Metadata (data about the data) is information that describes the audio program material. It is transmitted in the same transport stream as the audio program. It acts in combination with information provided by each listener, and allows individual receivers to produce the audio format each listener wants. The ATSC audio system is built around the metadata concept; without it the system cannot provide the listener with all the desired features.

The most obvious parameter is the channel count that enables custom downmixes. The Dialog Normalization (or dialnorm) parameter allows the receiver to present different programs to the listener at a uniform loudness level. Each program style, if not each program, has specific headroom requirements that dictate where in the available dynamic range the average loudness of the material falls. The receiver can use dialnorm to attenuate each program just enough to place the representative loudness level at (in the case of ATSC-compliant receivers) 31 dB below the clipping level. Because only the level is changed, the original program dynamics are untouched.

The choice of program dynamics is also enabled by metadata. The system establishes a "dead band" around the average program loudness (as defined by the dialnorm value) where no gain processing is done. Levels above the dead band can be reduced, and those below it can be brought up independently. This process leaves the loudness of the most important parts of the program (usually the dialog) unaffected.

The production crew has controls over the dynamic range reduction process. They can select the "dynamic range profile" that gives the most artistically acceptable effect for a specific program,

rather than relying on the processing applied by individual TV stations as is done today. The desired profile's name is included in the metadata carried through the contribution and distribution system with the program.

Ideally, metadata would be created at the same place as the program material, and carried with the program through the extensive series of contribution and distribution circuits required by a typical broadcast system. The post-production stage is probably the most logical place to author the metadata because it is where most of the production value decisions are made. Figure 1 shows a device in the monitoring path that allows the operator to select various meta-

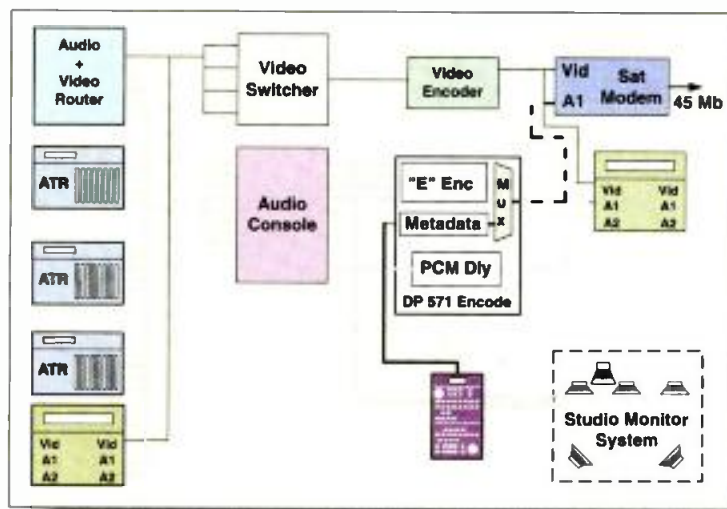


Figure 1. Dolby E allows post-production facilities to determine metadata parameters and encode and multiplex a 5.1 channel version of the audio program, Lt, Rt Dolby Surround versions, an NTSC version and metadata on one AES/EBU pair.

data parameter values, then emulates the effect of these values on the program.

Program contribution and distribution

Post-production facilities have to find a new release format for finished HD multichannel programs. The facility shown in Figure 1 is effectively a sealed environment: Signals don't travel in and out of the facility as they do in a broadcast operation. Adding audio channels is more a matter of patching in additional machines, than providing additional incoming and outgoing links. The problem does appear when a multichannel audio program leaves a post house. The emergence of mezzanine-level video rate reduction codecs allows existing tape formats to carry HD material, thus providing a path for the video, but the tape format itself is unchanged and limited to four audio chan-

nels (or two AES/EBU pairs). The Dolby E encoder shown within the post house facility encodes up to eight channels of audio and multiplexes the necessary metadata (one group of parameters per program) into the same data stream.

This can put a 5.1-channel program (with its metadata) plus an Lt, Rt Dolby Surround version of the program, with two programs worth of metadata, on two channels (or one AES/EBU pair) of the tape. The second AES/EBU track pair can be used to carry another Lt, Rt version of the program that has been created with the required dynamics for NTSC release. This is particularly convenient for stations that have no DTV service or digital infrastructure. They will be able to take the analog output of the NTSC track pair and operate as usual, but, with the matrixed surround encoding, they will also be able to maintain a Surround presence in their markets. This multiservice release format is particularly well suited to advertisements and programs with high production values, as it allows program producers to tailor the audio to the intended service but uses only one common tape format to carry them all.

Switching, editing and delay

The most common operation in the contribution and distribution process is cutting from one program feed to another. Most cut transitions are made at the vertical interval switch point of the video signal because it is convenient to slave the audio switcher to the video switcher and because transition points can easily be labeled with video timecode. The same idea applies to insert or assemble edits done on tape. The Dolby E system aligns the blocks of rate reduced audio data with the vertical interval switching points, as shown in Figure 2. Switching transients are eliminated by the decoder, which makes short cross fades between the end of one block and the beginning of the next block of audio information. Because the switching point and video frame duration can vary with different video systems, the Dolby E encoder uses the video reference signal ("color black"

or its equivalent) of the video system associated with the audio to generate the clock and timing information it needs.

Figure 1 shows the signal prepared for NTSC service passing through a one-frame PCM Delay path in the Dolby E encoder. This is done to match the delay in the non-encoded PCM signal path to the encoding delay of the E encoder, so that all the audio signals on the tape are in sync. The individual blocks of Dolby E encoded material must start and stop on video frame boundaries to ensure that audio-follow-video edits do not corrupt the encoded audio data, so the Dolby E encoding delay has to be matched to the frame rate of the video system in use.

The encoded data is fed to the decoder in one-frame blocks. The Dolby E decoder also has a one-frame decoding delay. This is not as cumbersome as it first sounds. The HD video encoder shown in Figure 1 takes a variable number of frame periods, depending on the desired data rate, to encode a HD video signal. Because this takes at least one video frame period, the audio encoding and decoding delays will be matched by the delays in the video path. From a system's point of view, audio and video signals leaving a process should always be in sync with each other to avoid building up offsets.

Dolby Digital (or AC-3) codecs are not intended for contribution and distribution service because of their limited concatenation ability. Dolby Digital also has a longer encoding (about 180ms) and decoding (about 40ms) delay than Dolby E, complicating the system timing issues.

Professional metadata

Dolby E carries metadata in a multiplex with up to eight channels of audio. Any one of the eight channels, or any combination of up to eight channels can be defined as a program, and thus have a group of metadata parameters associated with it. Most of the metadata is used by the Dolby Digital decoder to tailor the audio presentation to listeners needs, and so is referred to as *consumer metadata*. Dolby E also carries *professional metadata* that is used to autoconfigure the codecs in the signal path downstream of the origination point. The broadcaster can use other parameters in the professional metadata to resynchro-

nize, monitor and modify the level of decoded audio on a program-by-program basis. Professional metadata is never sent to the home DTV receiver.

SMPTE timecode, including the Drop Frame flag and user bits, is multiplexed into the data stream and recovered by the decoder. It time stamps the associated blocks of rate reduced audio, so it can be easily laid back in sync with the video signal. Decoders have a separate timecode output for the recovered signal to make it as simple as possible to integrate them with other systems.

Other information is included with the professional metadata, with a view to making the system easy to integrate. To avoid having to decode the Dolby E data stream just to drive a set of meters, individual channel level information is included with the professional metadata by the encoder. Measurements of the greatest peak level and of an RMS signal level of each channel are made over the entire encoded block. The amplitude resolution of the measurements is approximately 0.1dB. There is no attempt to provide a combined signal level for multichannel program groups.

Dolby E professional metadata also carries gain words that can instruct a decoder to change the level of a received signal. Each block of data carries two gain words, one applicable to the beginning of the block, and one that applies to the end of the block. If they are different, the decoder interpolates a linear ramp over the duration of the block (or over one frame of the associated video) to avoid "zipper noise" as the level changes. The gain range is from +6 dB to minus infinity and is applied to all channels in the program group equally. This provides a way to do V fades between program segments without losing a generation. Gain words within a few frames

of the end of one program segment instruct the decoder to ramp the level of the program down to silence, the switcher cuts to the next program segment whose gain words cause the decoder to ramp the level back to unity during another few frames.

The transport mechanism

The AES/EBU signal consists of two subframes that start with a four-bit preamble or sync word and are followed by 24 bits of audio data payload space. The subframes end with four additional bits (one each for the Validity, Channel Status, User and Parity bits) with a total of 64 bits for both subframes. Using the first 20 MSBs of the audio payload space for Dolby E data works well, as this is the maximum number of bits that can be recorded on typical studio level digital VTRs. It also makes the Dolby E signal compatible with the rest of the digital audio equipment in the plant. It can be switched, recorded, edited (cuts and insert or assemble edits) just like any other digital audio signal, as long as some basic precautions are observed. The data must not be changed by any part of the system it passes through, as this would destroy the coded audio information (and the metadata). Changes that would cause problems include: changing the gain, truncating or dithering the data, cross fades at splice points (butt splices avoid this problem) and any sample rate converters in the signal path.

Dolby E audio coding thus provides a point of production to transmitter path for multichannel audio and the necessary metadata, using the same codecs operating at the same data rates, throughout the system. ■

Steve Lyman is senior staff engineer for Dolby Laboratories, San Francisco.

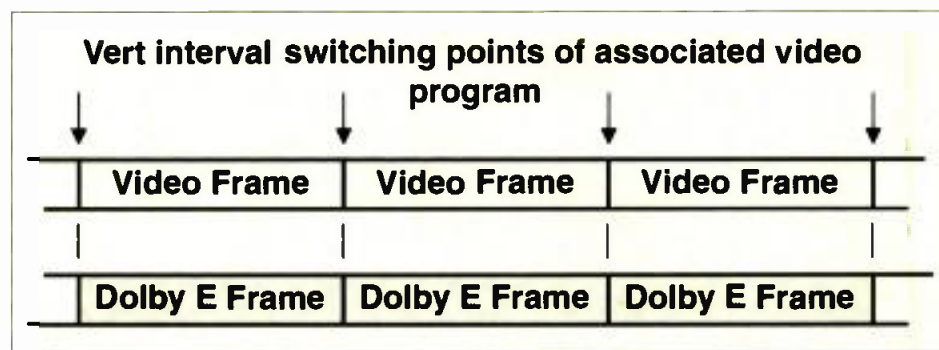
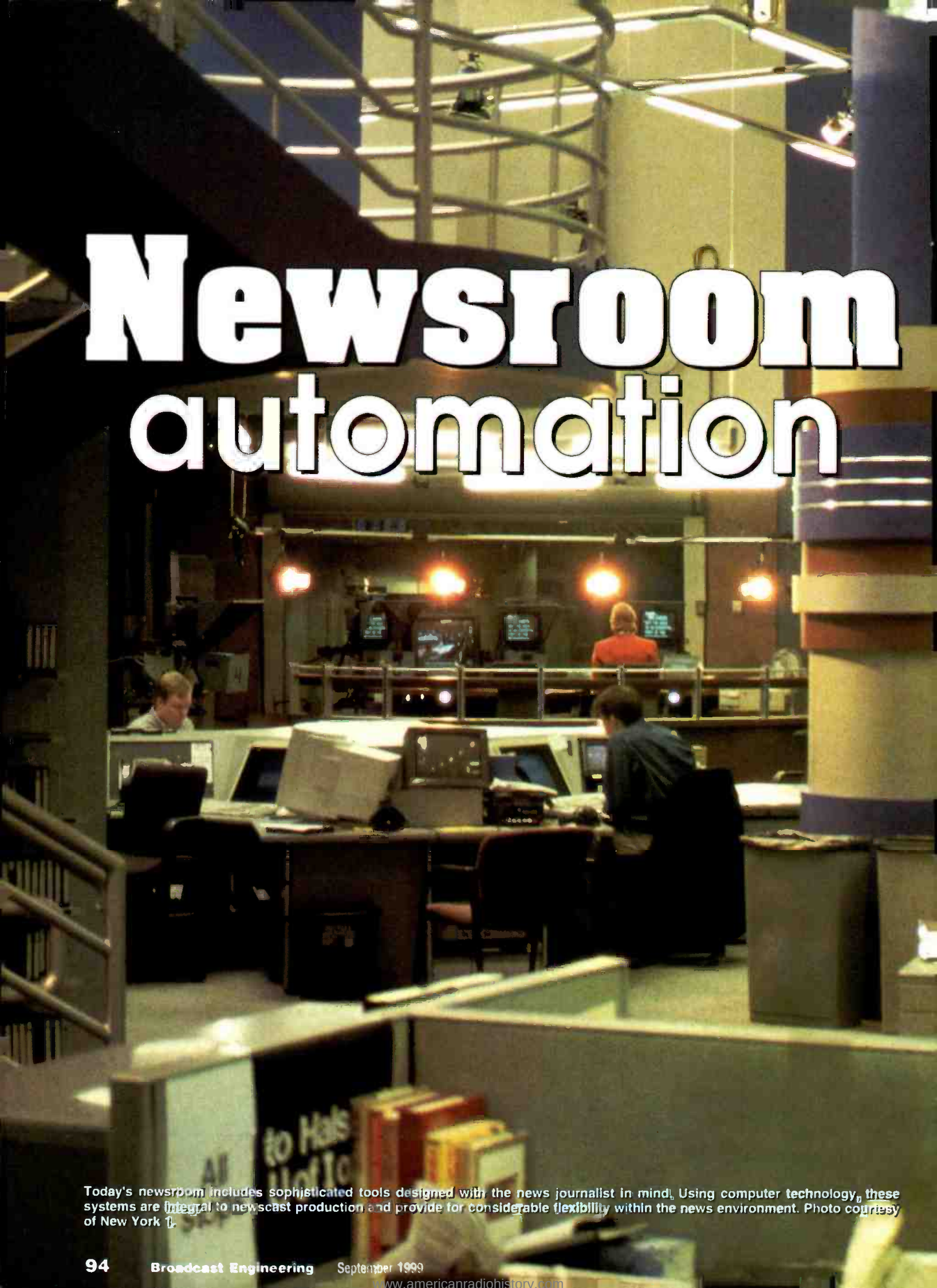


Figure 2. To prevent corruption of audio data during audio-follow-video edits, encoded blocks of audio data are aligned with the video's vertical interval switching points. During the decoding process, audio and decoding delays are aligned with video frame delays to ensure sync.

Newsroom automation



Today's newsroom includes sophisticated tools designed with the news journalist in mind. Using computer technology, these systems are integral to newscast production and provide for considerable flexibility within the news environment. Photo courtesy of New York 1.



By Dean Kolkey

Once upon a time, newsroom systems were simply scripting tools customized for television news. Today, these systems are more than just tools to organize and write a newscast. They can be complete automation systems capable of managing all the elements of a modern newscast.

Newsroom automation

Fully integrating the newsroom computer system with the newsroom automation system allows for the free flow of database information between the two applications. For example, the process of association can be simplified by having the newsroom computer system access the automation asset database and present the user with the current list of clips. After the user selects a clip its ID and timecodes can be automatically pushed into the newsroom computer database by the selection routines.

The association can be further aided if the production system includes a low-resolution proxy database. Lists of clips with displayed key frames can be presented to the user. The user can then verify a clip by viewing the MPEG copy before making a selection. Once selected, the clip information can be automatically moved from the automation system to

the newsroom system database.

The second point of contact is where the program that controls clip play-out monitors the newsroom run-down. It does so to detect story or run-order changes. This too can be aided by a single vendor level of

associated metadata and creating a low-resolution proxy of the graphical asset. Tools are provided to allow graphic artists to create standard templates that showcase the station's look. Specifying backgrounds and defining regions for the

With newsroom automation systems managing video and graphical assets as well as controlling the video production equipment, the production process changes.

integration. If the playout program is a component of the automation system, with native level access to the rundown database, responses are faster than an interface that communicates changes via a protocol.

Graphics production

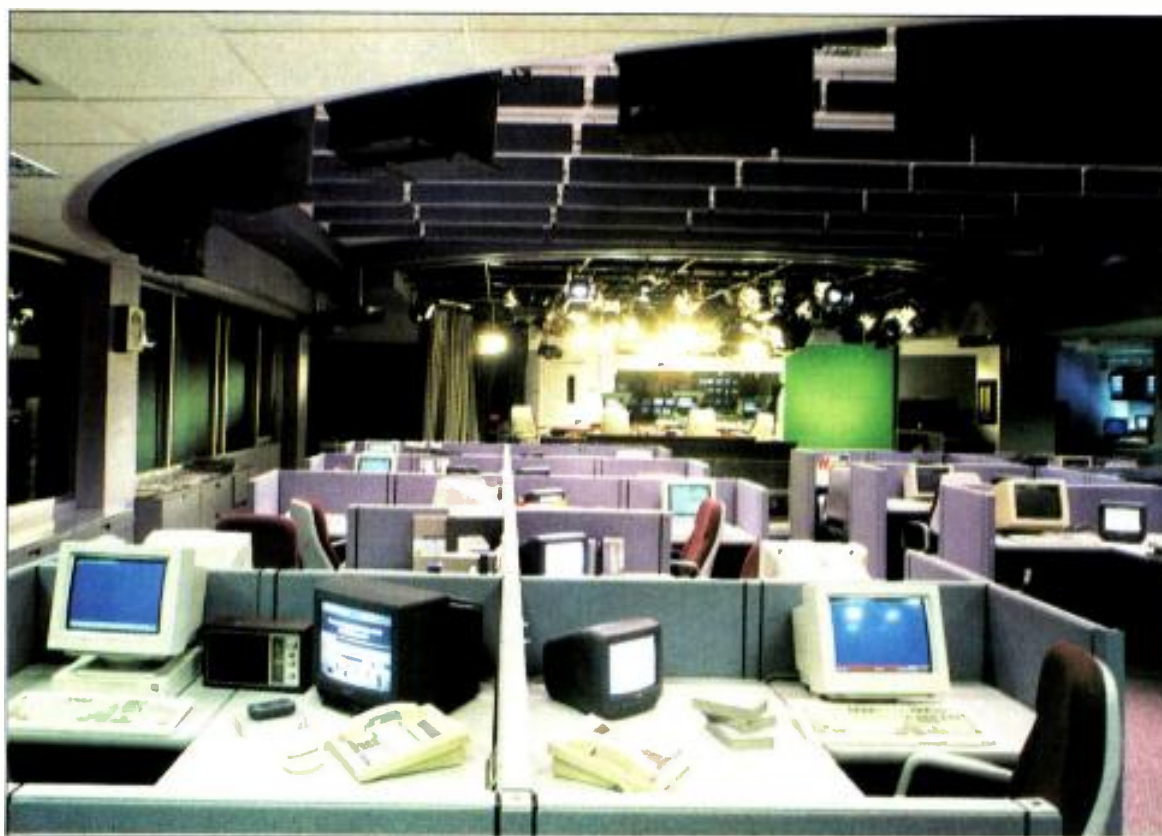
Today's newsroom computer systems can also be integral in the production of graphics for air. This process includes importing graphics into the production system, capturing

placement of text and graphics creates these templates.

A stand-alone application is then used to create full-screen templates with defined background and foreground regions. Each region can be designated for text or graphics input. The writer, while entering the script text, can then select a template, drag and drop graphics into place and add key text. On screen WYSIWYG previews of graphics and character keys can be viewed on the journalist's workstation using

only standard PC hardware.

While editing scripts in the newsroom computer system, writers may request a list of predefined templates. Once a template is selected, it is displayed. Users can add text to the appropriate areas. If a graphic region is selected, then the user is presented with a list of available pictures and is shown proxies. The key advantage to this approach is the ability to preview the final output on the journalist workstation. With this capability, users, within the newsroom



Older newsroom systems required a separate (typically RF) feed to route video to journalist workstations. Today, this can be done using high-speed networks and low-resolution MPEG encoders, saving space on desktops and increasing functionality. Photo courtesy The Systems Group.



Advances in server technology, coupled with the evolution of newsroom systems, have removed the emphasis on the control room switchers and tape-based cart machines. Photo courtesy TV4.

computer system, may create their own graphics.

Evolution of the production process

With newsroom automation systems managing video and graphical assets as well as controlling the video production equipment, the production process changes. In traditional news production, much of the focus was on control room switcher.

Today, playout of news material from video servers can be done using the functionality once provided by tape-based cart machines. In the server, multiple channels should be loaded with the next clips in sequence. The technical director can manually roll clips as needed. Channels can be played, stopped, recued or ejected. The virtually instantaneous load and cue time of video servers allows for up to the second run order changes. While cart machines could take 30-45 seconds to adjust to changes, a newsroom automation system with a video server can typically react within five seconds.

In an alternate production model, almost all material is prerecorded.

Instead of recording segments or even whole shows, each story is recorded as multiple elements. The introduction to the story is a separate clip from the story itself. This gives

ates an opportunity for today's local stations. During those periods the station is not broadcasting in high definition, an all news channel can be created using local content. A

Because everything is a distinct element, the rundown can be shuffled from show to show making each show appear unique, even though it contains old material.

broadcasters the cost savings of producing a story once but using it many times. Because everything is a distinct element, the rundown can be shuffled from show to show making each show appear unique, even though it contains old material. If stories become out of date, they can be updated or simply replaced.

Use of this model has allowed some 24-hour news operations to staff their entire facility for round-the-clock operation at a manpower level comparable to that required by a single show produced at a major market network affiliate. This model cre-

secondary revenue stream can be created through the modest incremental investment of a video server to contain the playout inventory.

Since the station already has the control room, talent, writers, material and video production equipment, creation of an all news channel requires only a modest additional investment. ■

Dean Kolkey is a founder of NewsMaker systems, Agoura Hills, CA, a member of the Nexus-Informatics ASA Group.



Graphics in post

Henninger has networked its facilities to allow designers to pass files between suites and even facilities to meet client needs. Photo courtesy Henninger.



By Steve Wiedemann

While the digital age has had a far ranging impact on all aspects of production, perhaps its greatest impact has been on graphics. Exploding demand for new tools of the trade make being at the forefront of graphics technology central to the success of companies in the post production business.

September 1994

Broadcast Engineering

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Graphics in post

graphics into projects. They can create the material and then post it on Henninger's FTP site in a password-protected area, allowing Henninger to download that material at any of its sites to begin to incorporate them into the project.

Networking also provides an ability to accommodate clients' schedules, even if the primary facility they work with is booked. For example, if the Richmond facility's Flame suites are fully booked, the project can easily be sent over the network to another Flame at another facility.

Good communication

Because projects often are worked on in disparate parts of the company, a password-protected area of its website provides easy-to-use infor-

tirely computer-based environment, there are a few things to take into consideration to safeguard that the system works smoothly. Files occasionally get corrupted when they are

Being able to produce quality graphics that are visually stunning and pleasing to watch on time and on budget is an art in itself.

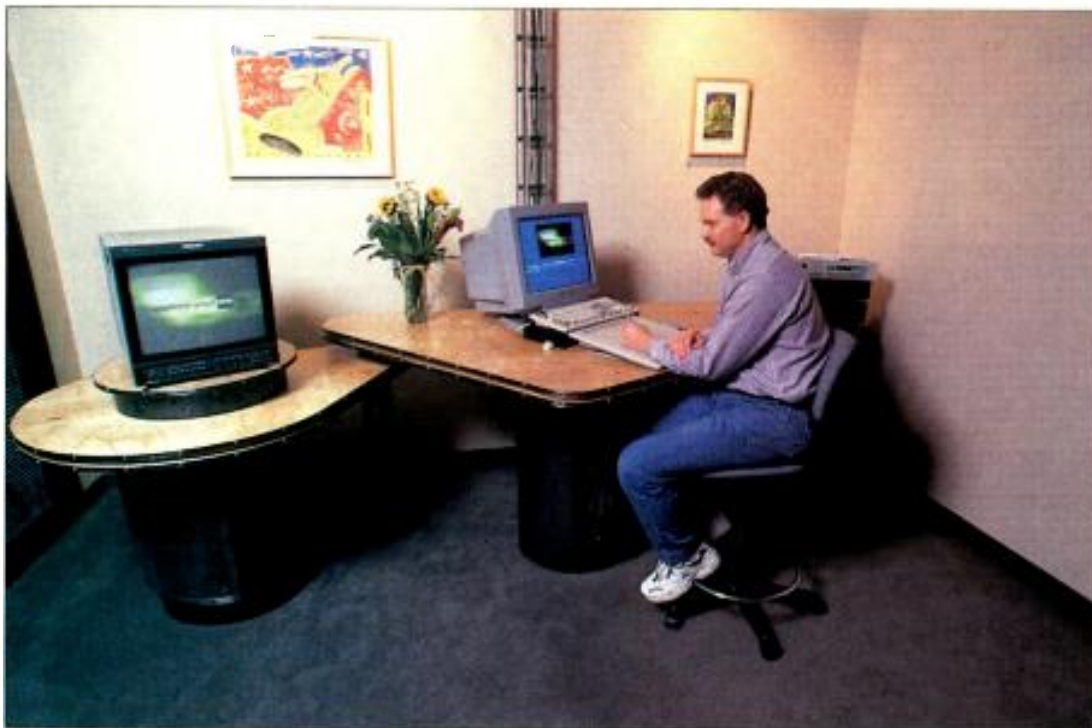
mation about what services are available at Henninger and at which facility. For example, account managers can have access to a glossary to keep them up to date on technical issues, terms and equipment. They can communicate with any member of the

sent over any network. As such, backups need to happen on a regular basis.

The benefit of these technologies far outweighs the additional safety precautions necessary to back up the system. The technologies and the

manner in which they are configured provide unlimited layers for compositing, rapid transfer of elements between machines in the network and random access of files and clips. This flexibility, combined with unlimited correction without loss of elements is a major plus. The acknowledged risks of storage cannot outweigh what has been gained.

Henninger is dedicated to the integration of the entire system — from technology to personnel, to create the best possible graphics for its customers. It takes talented individuals to make high-quality graphics with the various tech-



The popularity of Henninger's Flame suites makes it necessary to schedule smaller jobs to other resources. The facility's cross-platform capabilities make this technically and economically feasible.

Scheduling can be completely online, allowing account reps can see what is happening in rooms over the entire five site operation.

Keeping up with the technology and the network that connects it, allows the use a wide array of tools in completing projects in the right room, at the right price, in the right time frame. A full array of all of graphics capabilities is available to clients, no matter what location they choose to work in.

staff, from graphics to editing with a simple e-mail about what might be available and where.

This ability is critical in a time of rapidly expanding capability and technology. Many clients rely on Henninger's expertise to help them budget and plan. They cannot do this unless they have help from a knowledgeable staff.

The pluses and minuses

With increased reliance on an en-

nologies available today. Being able to produce quality graphics that are visually stunning and pleasing to watch on time and on budget is an art in itself. Success depends on integrating technology and talent to take abstract concepts into the realm of reality. ■

Steve Wiedemann is vice president, technology at Henninger Media Services.



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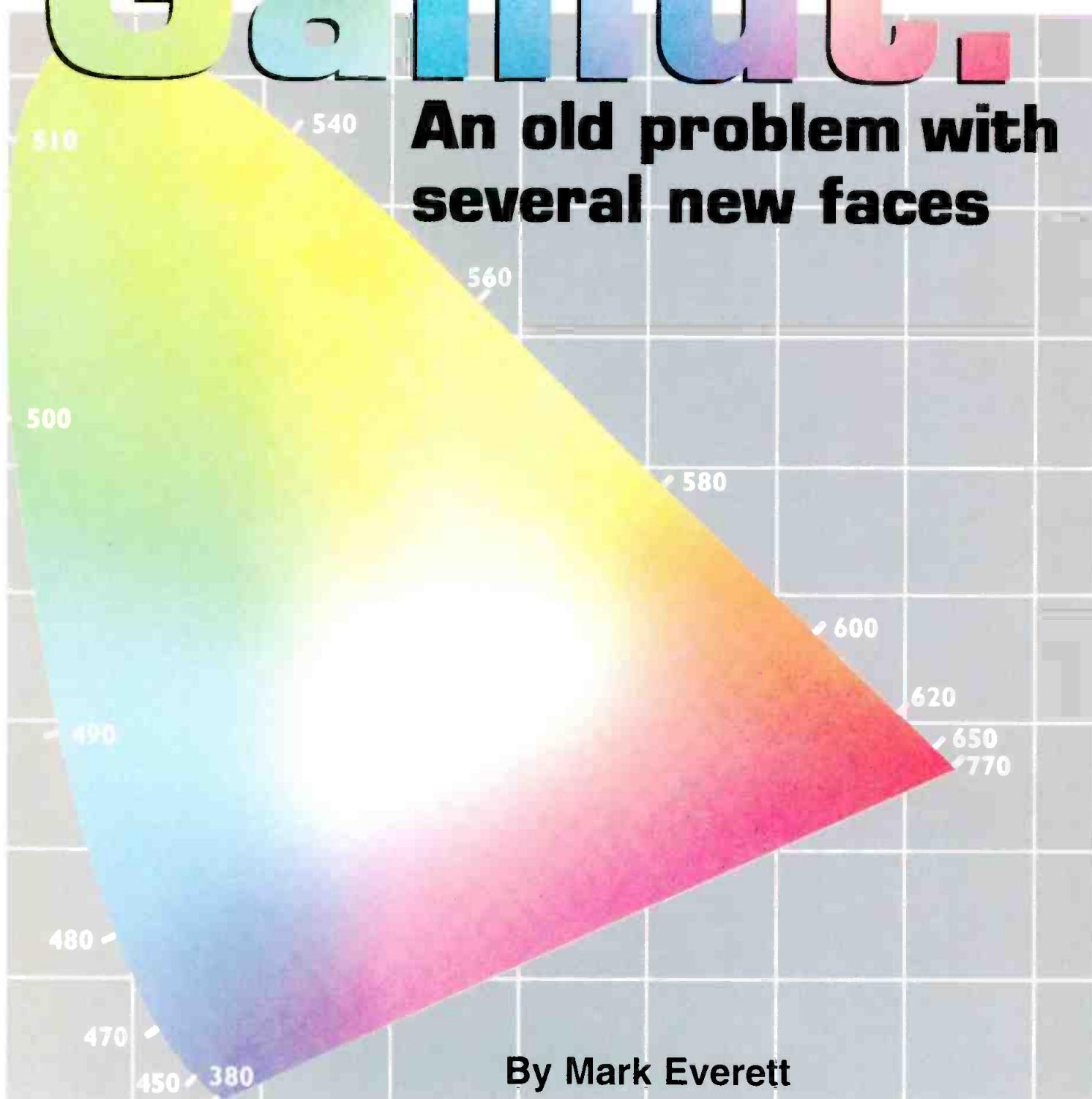
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Gamut:

An old problem with several new faces



Gamut, color space, over modulation, sparkles — these and other terms have been used (some correctly, some not) to describe a problem broadcasters and production engineers have been fighting for at least the last decade. Unfortunately, the problem is getting worse. The primary activators of this problem are improved equipment and the growth of 601 and HD digital production. Put simply, 601 and HD-based digital video are capable of producing a wider range of colors than is allowed in RGB or encoded formats. This, then, is the crux of the problem: When converting from 601 or HD-based serial digital video, some colors may not be acceptable (legal) in RGB or encoded formats.

The CIE chromaticity chart attempts to show the body of colors viewable to the majority of people. Various color reproduction schemes are representative of only a segment of the chart. No present reproduction scheme can portray the entire gamut.

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Gamut:

Gamut is defined as the complete range or extent of something. Color gamut, at least for this discussion, has to be further defined to describe the limits applied by the specific color space. The gamut of color is quite different, depending on the color space in question. Visual color, the range seen by the human eye, is the largest and most comprehensive color space or gamut with which most of us are familiar. CIE chromaticity charts, a plot of all colors visible to a large sample of humans, are often used in these types of discussions (see p. 106). Whenever these charts are used in television discussions, a triangular subset of that visible color is shown to describe the gamut of the device under discussion—SMPTE phosphors, imaging tube gamut or magazine print color limits. You get the idea; all are different and none include all visible colors.

Television color space

The television industry has, over the years, developed three basic means of color space definitions. Each is significantly different in definition and the resulting gamut. They are known as Y/Cb/Cr, RGB and HSL. All component-based digital formats—601 and the HD variations—are Y/Cb/Cr defined formats where Y is the luminance and Cb and Cr are the color difference signals. Crudely defining these, Y describes the luminance or monochrome element of the video, and Cb/Cr are close relatives to B-Y (Cb) and R-Y (Cr), which are the primary colors Blue and Red minus the luminance (Y) element. The exact definition of Y varies from one format to another, and that affects, among other things, the ex-

act interchange of colors between formats. The discussion and the definition of specific colors are not included in this article. Suffice it to say that there are differences. RGB refers to red (R), green (G) and blue (B), the primary colors used in our additive color system. Many video sources and storage devices are computer based, and these, as well as many video and computer monitors, operate in the RGB color space. HSL refers to hue (H), saturation (S) and luminance (L) and is generally applied to encoded

video formats. These are the three very different and common ways to describe color video.

The real problem goes back to one of my initial statements and needs some further definition. The limits of colors allowed in the three color spaces are different. As it turns out, 601 and HD color space is the largest of the three, and includes almost all of the other two. Almost all? There is one exception: analog composite super black. Many years ago, an idea referred to as super black was developed to assist key-

ers. In the U.S. version of NTSC, the black level is 7.5 IRE. In other forms of NTSC and PAL, the black level is 0 IRE or units. Super black lowers the black level of the background of, for instance, the character generator to 0 or lower in the U.S. version of NTSC and to -10 or lower in other formats. 601 and serial HD definitions can not handle super black. The lowest a U.S. NTSC from 601 conversion can go is approximately 1.5 IRE and the lowest the others can go is about -6.5 units. Excluding that historical anomaly, digital color space includes all other video color spaces and has plenty of colors unique to digital gamut.

The various SMPTE and ITU mapping formats for digital definitions describe the mapping of the luminance and color difference signals to data values. These coding rules allow for color saturation and luminance values beyond comparable colors available in RGB or encoded color space. A common view of Y/Cb/Cr color space in a 3D perspective (see Figure 1) shows a traditional view of 601 or HD component digital video color space. It has 1024 (numbered 0-1023) samples in all three axes. Note that black is located at the midpoint of Cb and Cr samples at the 0 luminance level and that white is also at the similar midpoint at the

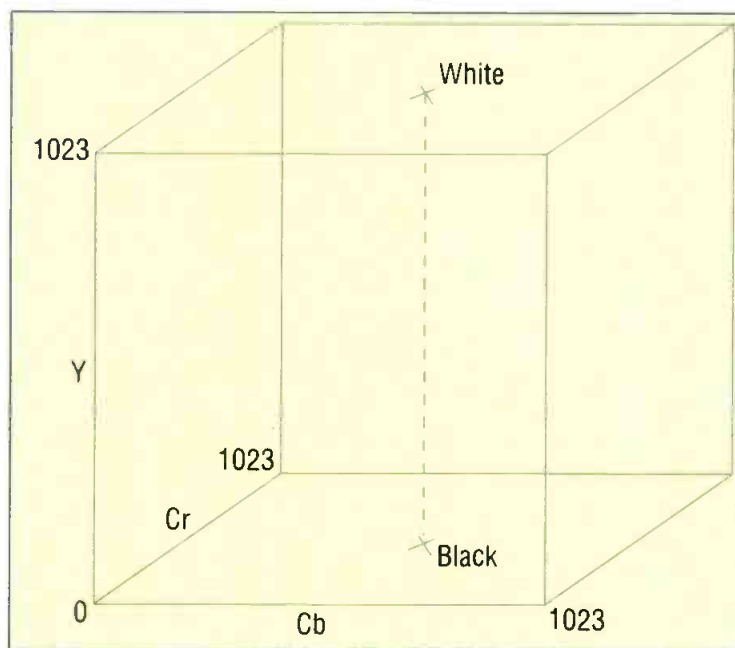


Figure 1. Y/Cb/Cr color space consists of a cube with 1024 (numbered 0-1023) samples in all three axes. Black is located at the midpoint of Cb and Cr samples at the 0 luminance level and that white is also at the similar midpoint at the 1023rd luminance sample.

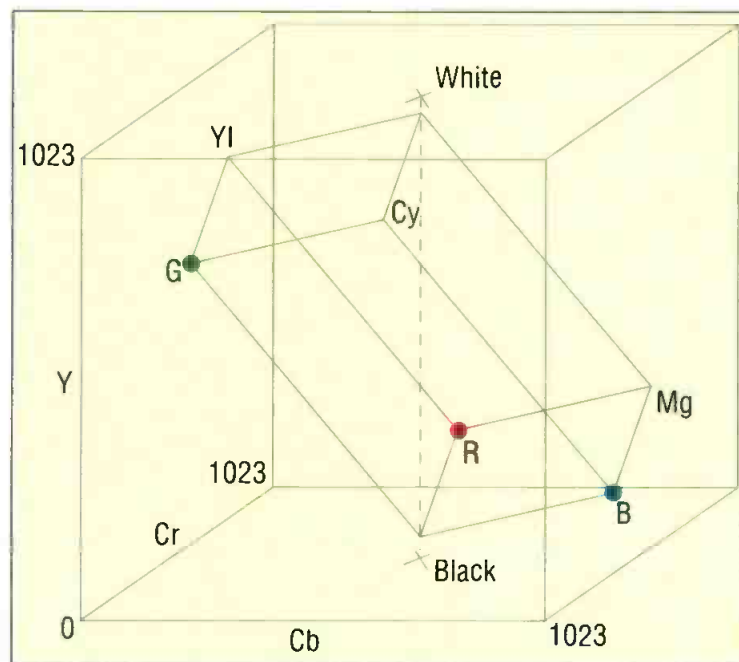


Figure 2. Y/Cb/Cr and RGB color space. The RGB cube is oriented entirely differently than the Y/Cr/Cb cube, and all the sides of the RGB cube are of equal length. For RGB, black is the point at the origin of 0 R, 0 B and 0 G, and white is diagonally across the cube at the point of all colors (additive white).

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Gamut:

1023rd luminance sample.

The more traditional RGB color space is defined as separate R, G and B video signals of equal bandwidth and limited in amplitude from 0- to 700mV. This, of course, assumes a non-composite signal. The RGB (sometimes called production) gamut limits are clearly defined and without dispute throughout the world. Gamut problems occur when video is introduced to an RGB based system that exceeds the lower or upper limits. In some cases, the video will be distorted, folded, clipped or passed depending on how the particular device handles that particular out-of-gamut video. That distortion, clipping or other unexpected color is a result of a conflict in gamut spaces. The representation of the RGB color space is shown in Figure 2, and is superimposed over the Y/Cb/Cr cube. Notice that the cube is oriented entirely differently than the first cube. In the case of RGB, black is the point at the origin of 0 R, 0 B and 0 G, and white is diagonally across the cube at the point of all colors (additive white). All sides of the RGB cube are of equal length, as are the sides of the Y/Cb/Cr cube. Notice there are a number of spaces (colors) in the Y/Cb/Cr

space with a more complex consideration including both luminance and saturation. Hue is not a base issue in this definition. In the case of NTSC video, allowable luminance is from 7.5 to 100 IRE, and allowable chroma is from -20 to +120 IRE. Now already some of you are saying, "In my facility we use 110

agree that luminance goes from either 0 or 7.5 to 100. Different color systems, governments, networks and broadcasters have their own rules about maximum chroma, which varies from 100 to 133 and from 0 to -33.

Hue, as stated earlier, is not an issue in encoded gamut limits. Do not be confused by the saturation of various colors of bars in encoded color bars. The highest and lowest luminance color bars have the lowest saturation. The higher saturations in encoded color bars belong to the middle luminance color bars. The hue of yellow or red is still in the family of yellow or red, no matter what the luminance value. Figure 3 includes the third element to this issue of gamut. The encoded addition first follows the luminance of the Y/Cb/Cr color space. The allowed white and black points are flattened and only a relatively small amount of chroma is allowed at these limits. As the luminance changes, from either limit towards the luminance midpoint, the allowed saturation increases.

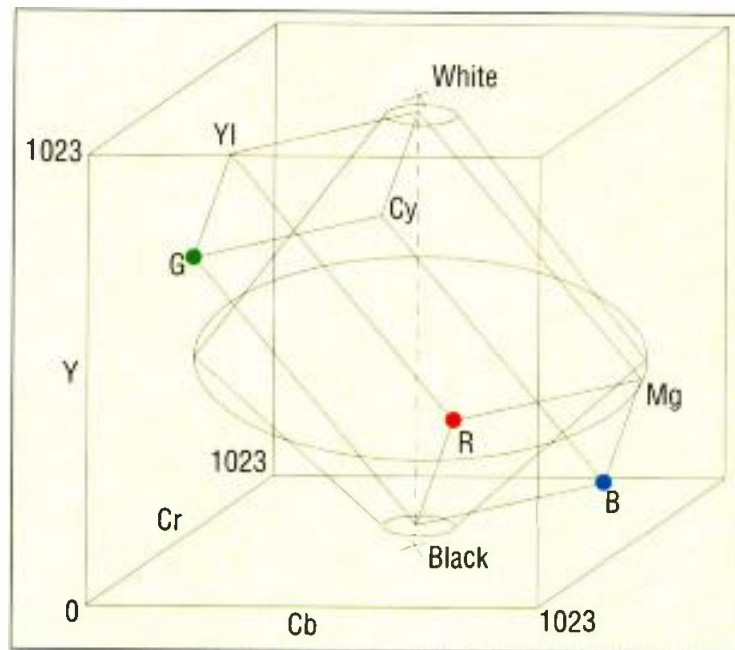


Figure 3. Y/Cb/Cr, RGB and encoded color space. The encoded space follows the luminance of the Y/Cb/Cr color space. The allowed white and black points are flattened and only a relatively small amount of chroma is allowed at these limits. As the luminance changes, from either limit towards the luminance midpoint, the allowed saturation increases.

IRE maximum." OK, just stick with me for a bit. There are many variations, but the concept should be explained first. If I have a video signal with a luminance value of 50 IRE, the chroma modulated on that video is allowed to transition from 120 to -20 IRE. If that same video with that same chroma is simply raised in luminance from 50 to 60 IRE, then the modulated chroma exceeds the limits —

increases. The resultant diagram looks something like two truncated cones. It is now more apparent that some colors that fit in the RGB color space do not fit in the encoded chroma space, and conversely, some colors that fit in the encoded color space do not fit in the RGB color space.

The problem of gamut is not a problem if the video in question remains in only one color space. It only becomes a problem when video is originated in one color space, HD serial digital, for instance, then downconverted and encoded into NTSC for broadcast. There are any number of colors which are included in the digital color space which will not fit and can not be transcoded into the RGB or encoded color space. This affects the saturation of green leaves, the color of the commercial product, and sometimes colors simply change from one hue to another. Prevent surprises, be aware of gamut differences and be prepared to deal with them. ■

Gamut differences affect the saturation of green leaves, the color of the commercial product, and sometimes colors simply change from one hue to another.

cube, which are not included in the RGB cube. What may not be so apparent, is that all colors represented in the RGB cube are included in the Y/Cb/Cr cube.

For encoded signals, the issue is more clouded. This concept is a bit more difficult to grasp because the encoded rules (both NTSC and PAL) define the video

it goes to 130, 10 units over the limit. The chroma saturation must be reduced by 10 units in consideration of this new luminance level. Judgments relating to color space of encoded signals must consider both the luminance level and the color saturation of the video signal. It turns out that we all (NTSC and PAL)

Mark Everett is vice president, advanced technology for Videotek Inc., Pottstown, PA.

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pered, if it were capable of functioning at all.

Your statement regarding third party tapes, "Third party tapes are not the answer (neither manufacturer recommended them)," also appears to lack some tape manufacturing enlightenment. Any tape cassette bearing the name or logo of a particular format, with the possible exception of VHS, must be approved by the format owner. To obtain approval from the format owner, a tape manufacturer must design and internally test new format prod-

statement and ask them to put it in writing. And because it is purely a scare tactic to augment tape and spare parts sales, it is amazing how quickly they back down.

In closing, almost all media manufacturers strive to produce recording media that is virtually transparent to the format it is used in. This is especially true with media used in digital transports as they are recording ones and zeros in a very near saturation recording vs. analog recorders that generally use an FM recording system, which is

It is highly unlikely that any third party tapes would create any kind of incompatibility issue with the specific format they were designed, approved and licensed for, or in another compatible format. — George McBride, Maxell

ucts and then submit samples to the format owner for qualification. The format owner then tests and evaluates the physical, magnetic and electrical attributes of the cassette shell, the tape, and the overall performance of the finished product prior to granting a license to the manufacturer's cassettes for a specific format. Therefore, it is highly unlikely that any third party tapes would create any kind of incompatibility issue within the specific format they were designed, approved and licensed for, or in another compatible format.

In response to the \$800 estimate for the repair of Leland's DCR VX 1000: It is a fairly common practice in the TV industry, when acquiring new recording equipment, and especially when changing formats, to use media bearing the same name as the equipment until the problems and issues are resolved.

For an equipment manufacturer to make a statement such as, "they would not guarantee any repair that didn't include the replacement of the head drum and the entire tape path due to the use of non-Sony or non-Panasonic tape which caused deposits," could be construed as a violation of the Sherman-Clayton Anti-trust Act and readily end up in litigation. I continually advise customers who receive statements like this to approach the source of such a

typically more susceptible to "screw-driver drift" and/or ambiguous or misunderstood alignment techniques. I can still clearly recall the preposterous statement from an editor at a large post house, "brand 'X' tape looks warmer than brand 'Y'," while viewing playback from a Digital Beta unit.

It really boils down to the brand of equipment and tape users are most comfortable with and most loyal to. The differences between brands of tape used in today's digital recorders are virtually insignificant leaving the procurement folks in a terrible quandary when trying to decide what to buy.

Sincerely,
George McBride
Maxell Corporation

Dr. Digital responds:

There's some new light on an old subject. I've been digging into this tape/VTR matter and Bob's comment regarding following the recommended maintenance schedule is very important. Sometimes, it is easy to forget that times have changed. Today's small format VTRs bear little resemblance to 2" Quads, but many of us insist upon using those tried-and-true maintenance routines that worked so well in the days of the four-headed beasts (when was the

last time you tried clearing a head clog with your fingernail?). These new decks are different animals and need to be maintained accordingly. Along those lines, the use of cleaning tapes (something many of us dreaded five to 10 years ago) is typically a necessary part of the maintenance routine.

As I mentioned in that July column, a lot of science goes into today's products. The same is true regarding product maintenance. I recently had some restoration work done on my wife's car. After picking it up I discovered there was some sticky residue from the masking tape left on one of the fenders. Not wanting to mess anything up, I called the shop and spoke with the gentleman that painted it to find out what solvent I could use to remove the residue. Much to my amazement, he gave me a chemistry lesson! He went into how the paint base was constructed and why several solvents would not cause it problems because of the molecular structure of the product, etc., etc. The point here is that the manufacturers know far more about these products than you and I. To get the most out of our money, we need to follow their recommendations – at least within reason.

What kind of problems are you having? What has been your biggest maintenance headache in the last six months? Drop me a note at drdigital@compuserve.com. ■

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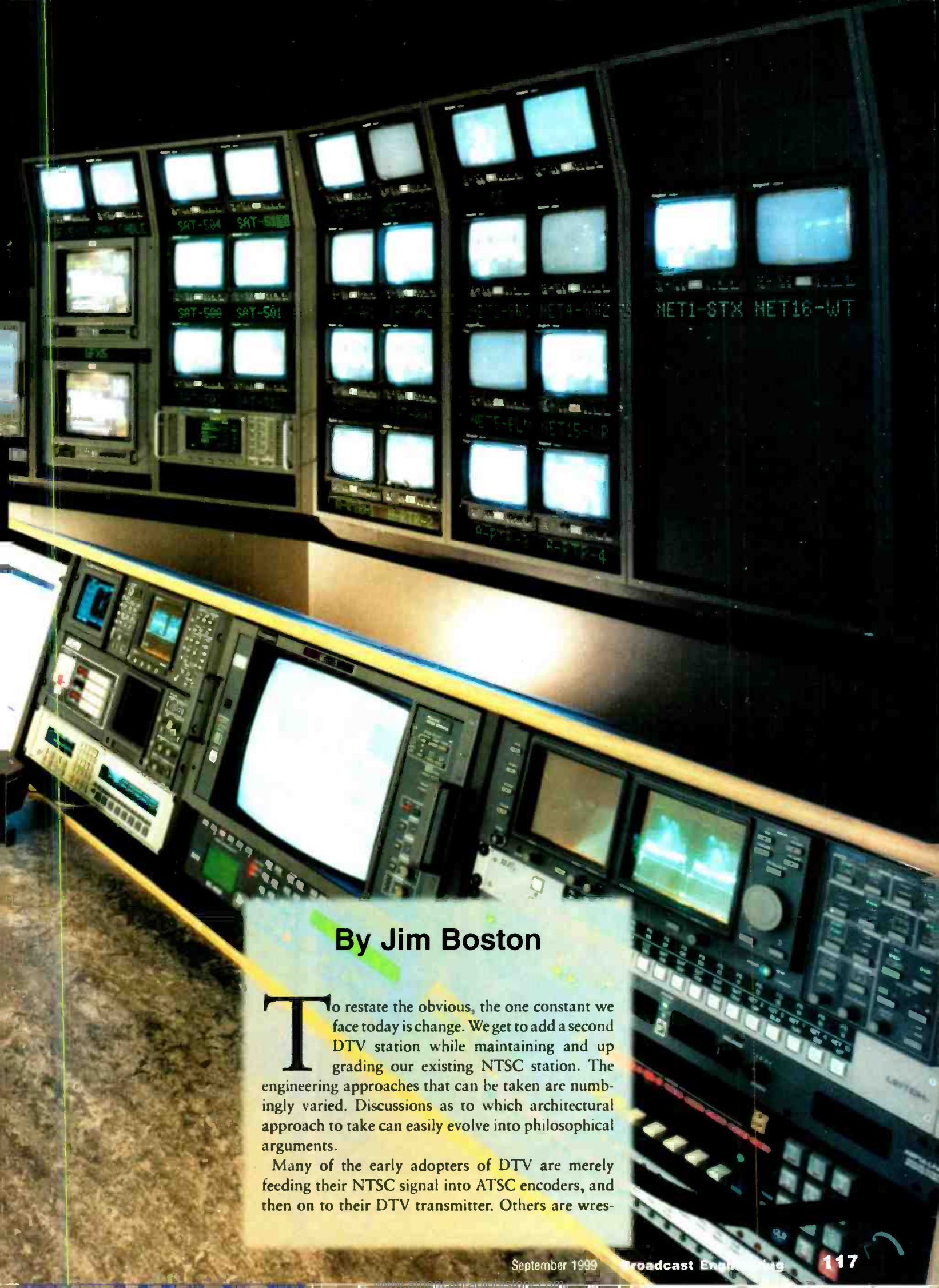


DIGITAL TV
TRANSMITTER

A photograph of a broadcast control room. In the foreground, a curved desk holds a mixing console with many buttons and sliders, and several computer monitors displaying various images. In the background, a wall is covered with more monitors, some showing video feeds and others with technical data. The room is dimly lit, with the primary light sources being the screens. The overall atmosphere is professional and technical.

Managing your transformation to DTV

The better a facility is designed and built in the beginning, the more likely it is to operate reliably over its long life. The master control room at the new production and broadcast facility for Thirteen/WNET, New York City, provides ample room for both equipment and personnel. Photo by Andy Washnik - Capricorn. Photo courtesy A.F. Associates.



By Jim Boston

To restate the obvious, the one constant we face today is change. We get to add a second DTV station while maintaining and upgrading our existing NTSC station. The engineering approaches that can be taken are numbingly varied. Discussions as to which architectural approach to take can easily evolve into philosophical arguments.

Many of the early adopters of DTV are merely feeding their NTSC signal into ATSC encoders, and then on to their DTV transmitter. Others are wres-

DTV

digital video layer, there are usually layers for analog video and stereo audio, along with AES audio and, possibly, a layer for RS-422 control. All inputs and outputs to all routing layers should appear at patch panels. Many facilities that build extensive digital video infrastructure still use analog audio. This is usually because digital audio is much more expensive to implement than analog audio. Digital audio can also be much harder to troubleshoot than digital video. Analog audio can also provide some flexibility at the patch panel that is not possible with AES audio. Many facilities now wire analog audio between equipment with low Z out, to hi Z in.

This means that the source impedance is at the traditional 110Ω at the output of a device, and the input of the receiving device is at $10,000\Omega$ or higher. Although this configuration results in reflections, runs are short for audio wavelengths, so they can be ignored. But there are two benefits. Signal-to-noise drops by half because the received signal is twice the terminated amplitude. Therefore, the drive level can be dropped by 3dB with a corre-

applied voltage is desired and impedance matching is not as important. The second benefit of this approach is that the audio patch panels can be wired in what is known as half normal. This configuration means that if a patch cord is inserted in the top jack in the patch field, the path isn't broken, just bridged across the source. If the patch

longer than promised; shortcuts will be taken or attributes cut; and the reliability and flexibility of the system produced by the project will suffer. A common maxim among project managers is the choice between done fast, done inexpensively and done right. You can only achieve two. You can pick which two, but the third won't be met.



DTV facilities must handle several layers of data, including video, audio, control and metadata, plus legacy analog signals. KHOU, Houston, routes both standard and high-definition signals through its dual master control rooms. Photo courtesy of Tektronix.

is inserted in the lower jack, the signal from the top jack is interrupted. This means that audio monitoring can occur without interrupting the feed. This is only possible because of the low-feed Z/hi-receive Z approach.

The scope

One of the most common afflictions of a failed project is scope creep. New objectives are often added to the plan even after the project's mission and

Managing the scope of a project is often the project manager's toughest job.

A word about doing the project right should be offered here. Most facilities become more chaotic as they age. Even meticulously designed, assembled and wired facilities can become unruly with time. As the system is amended, modified and troubleshoot over time, patch bay labeling, wire bundles, wire lists and synoptic drawings become inaccurate and disorganized. It is the rare maintenance supervisor who can prevent this slow atrophy of organization.

The best facilities start off as well designed and thoughtfully implemented. The better designed and built the facility is at the start is generally a good indication of how well it will be maintained over time. Cabling a rack is equal parts science and art. Knowing what pitfalls to avoid and still make the cable bundles neat yet serviceable is the installer's bread and butter. The old saying about clean cars running

Good engineers are tenacious. They research, ask questions, and listen.

sponding drop in S/N. It used to take power to drive audio devices. When this was true, impedance matching was important to maximize power transfer. Now it takes voltage, with very little current. Therefore, maximum

strategy are determined, the objectives and budgets are defined, and the project has been started. The project can grow in size even though the resources remain fixed. Even if you manage to stay within budget, the project will take

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DTV

better than dirty ones translates to neat, orderly installations running better than a rat's nest. To keep the installation neat and serviceable, things like service loops, manageable bundle size and proper cable routing must be adhered to.

Professional implementers also color code cables. The coax used for digital video is a different color than the coax for analog video. This makes it easier to quickly acquire your bearings when

component video) has energy approaching 1.5GHz. SMPTE 292M (HD digital component video) has energy well over 3GHz. Why? Bit shuffling algorithms in 259 and 292 are designed to produce as many edges as possible. This makes it possible to think of these bitstreams as square waves. How do we build square waves? We take the fundamental and add odd harmonics. That means that for 259, the fundamental is half the 270Mb/s rate, or 135MHz. The third harmonic of this 135MHz fundamental is 405MHz. The fifth is 675MHz, etc. As the higher harmonics disappear, our square wave becomes more like a sine wave. For

The dielectric should produce as low a shunt capacitance value as possible. Coax that is good for digital signals has low shunt capacitance. This equates to high-velocity propagation. The cable should also be flexible, with minimal center conductor migration. Any impedance mismatches along a digital signal path push you closer to the error cliff due to the resulting reflections.

The intangibles

As DTV rolls out, demands placed on television engineers will be acute. Many of us will be betting our jobs and reputations as we engineer our employers into the digital domain. Good engineers don't necessarily know everything. In fact, with all the new technology engulfing us, who can? Good engineers are tenacious. They research, ask questions and listen. They have a sense of history, so they can combine experience with theory. They take what has worked in the past and add new methods and technology to solve new problems. This is the engineering method.

Some of us will be blessed with large budgets and the best equipment to throw at the problem, most of us will not. To compensate for limited monetary and physical resources, good engineering must be applied. The goal is to be the best steward of your facility's information content as possible. That used to mean the video and audio signals. Now it also means not only the continuous

analog voltage streams, but many discrete digital number sequences, or bitstreams.

Engineering is always about compromise and tradeoffs. Good engineers know where to give and where to stand firm. A well-designed facility will be fault tolerant and flexible. It will be easy to monitor, and problem isolation will be straightforward. It must also be as future proof as today's technology will allow. ■

Jim Boston is a project engineer for Scripps Howard in Cincinnati, OH.



Because digital audio can be much more expensive to implement than analog audio, many facilities are sticking with analog for the time being. However, some stations like ABC TV7, New York City, have taken a wholesale approach, planning for and implementing AES audio during their upgrades. Photo by Andy Washnik Studio. Photo courtesy A.F. Associates.

dealing with racks that have various signal types. The hurdle is that your engineering department must have the discipline to maintain the color-coding.

One of the most important components of a television facility is the cable that interconnects the equipment and weaves the various discrete devices into a system. Many underestimate the impact that cable and connectors have on signal performance. Digital component video stresses coax on the order of a couple magnitudes over what analog video does. Rarely does analog video have frequency components over 10MHz. SMPTE 259M (SD digital

most digital devices receiving the signal, the third harmonic must be 8- to 10dB above the noise floor. The fundamental for 292 is 750MHz, and its third harmonic is 2.25GHz. For a coax cable to pass digital signals any distance, its rolloff of higher frequencies must be kept to a minimum.

Coax used for digital video bitstreams should have solid copper center conductors. This offers better skin effect than stranded center conductors do. The shield should be braided, with coverage as near to 100 percent as possible. There should also be a layer of foil with the braid, as this also offers better skin effect at higher frequencies.



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Philips' Venus routing switcher HD module expansion

BY JOOP JANSSEN

With the advent of DTV and the decision of broadcasters and national cable networks to distribute programming in high definition, one of the challenges to facility design engineers, chief engineers and operations managers is how to distribute a variety of signal types throughout facilities. Today, a single facility might have to route analog video, digital video, HD digital video, analog audio, digital audio, and machine control data. Every Venus routing switcher system built since 1992 can route any or all of these signal types, including high definition at 1.5Gb/s, with the proper modules. What makes this happen is the high-speed Philips COBRA system.

COBRA (Crosspoint Output Bus Router Architecture)

The COBRA system allows current and future Venus owners to mix-and-match signal types within a single frame – analog video, digital video, HD video, analog audio, digital audio and machine control data. All without sacrificing crosspoints. The system is built around the Zero-Insertion-Force (ZIF) connector system that has been successfully used in the Venus routing switcher frame since its introduction in 1992. While ZIF connectors are not new in the design of professional video equipment, the ZIF connectors used in the Venus are self-cleaning and top-mounted (top-plane) to prevent debris from accumulating in the connector. For example, each Venus router frame has 24 matrix module slots, associated cabling and panels, two sets of cooling fans, dual power supplies for redundancy and up to two optional accessory modules, all in

11RU. That means that four Venus frames can be installed in a single 45RU rack, allowing up to 96 matrix modules with ventilation in a single equipment rack.

Modular expandability

It is a popular misconception, especially among those manufacturing fixed frame video routers, that bus structure-based routers are not capable of handling the high data rates associated with uncompressed high-definition digital video. While the Venus analog video router inputs utilize a looping bus, the Venus Serial digital video router inputs utilize a unique passive parallel distri-

situation with analog video where the return loss of video inputs must be good (usually better than -40dB) in order to permit looping of video through several pieces of equipment. The good return loss performance minimizes reflections of the video signal. Philips developed the COBRA method of moving signals from multiple sources without introducing significant impedance discontinuities and their inherent signal reflections.

In the COBRA system, one end of the interconnection bus is terminated at the matrix end of the ZIF board. (See Figure 1.) The other end of the bus is terminated in the output board. The matrix boards feed the bus through

isolation networks that isolate the ZIF connectors and matrix boards from the bus. This isolation prevents the ZIF connectors and matrix boards from causing impedance discontinuities on the interconnection bus, thus eliminating reflections caused by the matrix board connections.

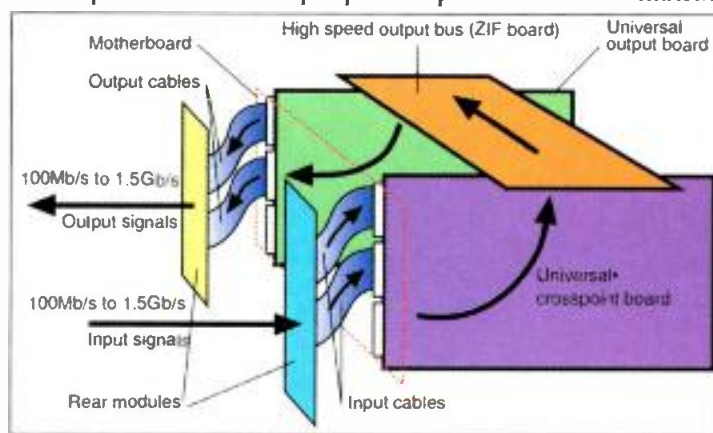


Figure 1. COBRA's structure avoids busing problems and makes it possible to connect the crosspoint modules to the output modules.

bution (PPD) architecture. Similarly the Venus HD routers use an input distribution system that is optimized for the HD signal characteristics. Our COBRA structure avoids busing problems and makes it possible to connect the crosspoint modules to the output modules, allowing the HD Venus to use the same architecture as all other Venus switchers.

Engineering COBRA interconnectivity

Busing of signals from multiple sources and/or to multiple destinations is possible if no significant impedance discontinuities are introduced onto the transmission line. This is similar to the

Separate matrices for SD and HD—cost effective upgrades

The Venus digital video approach allows HD router capacity expansion as needed. For example, a 64x64 HD router that is prewired for 128x128 allows expansion on demand. This is especially important as a facility migrates from SD to HD signals in small blocks.

Transparency is another benefit of the Venus routing switcher HD modules. The same HD I/Os can be used for SD and HD signals. In fact, Venus HD modules support signals of less than 100Mb/s all the way up to full uncompressed HD at 1.5Gb/s. Venus users do not have to purchase different I/O modules for HD and SD, and

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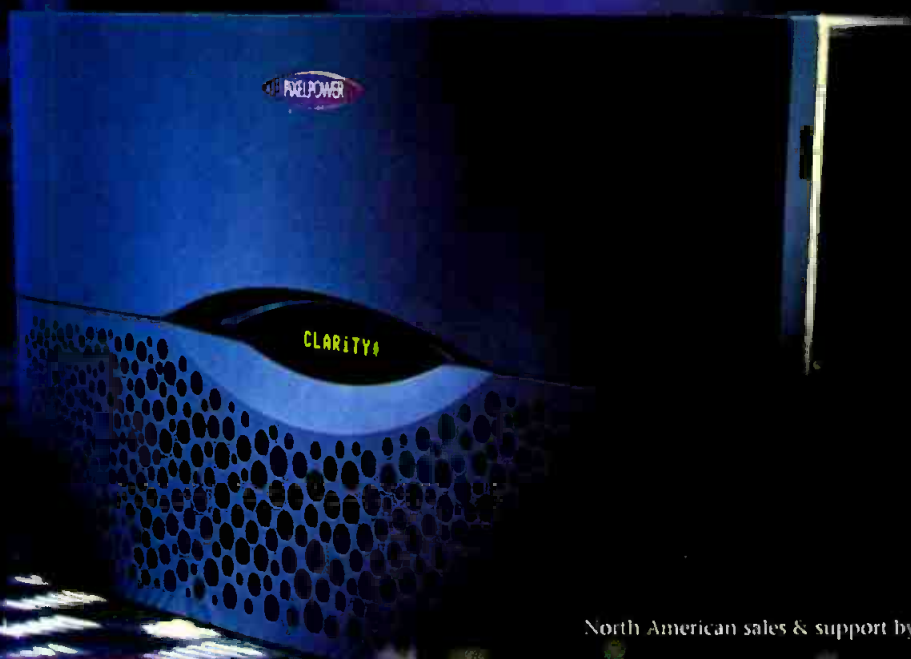
Clarity comes standard with an interface to newsroom computer systems, a 2GB Jaz disk, CD-ROM drive and 100Base-TX TCP/IP networking. It also features file import and export capability including the most common image and font types.

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Clarity is like no other HD graphics system. Available in single and dual channel configurations Clarity is software switchable between 1080i, 720p and 1080p24. Looking forward Clarity has the hardware headroom to allow operation at 1080p60 (3 GB/s) as standards evolve into the future.

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do not have to worry if I/O modules will continue to be available. Venus HD modules are capable of handling SD up to 100 meters, just by changing the cabling and flipping a switch.

The upgrade to HD

Field upgrading any Venus routing switcher to HD is a simple task. Let's take an example of a user who wants to add 32 x 32 HD routing capability to an analog or digital video router that has unused (uninstalled) slots. Four empty slots (out of the 24 total) and the HD expansion kit are needed. The procedure is simple, with the Venus remaining online throughout the procedure:

1. Remove blank rear board.
2. Install new rear panel with new connectors.
3. Attach rear panel cables to matrix board.
4. Install or replace the ZIF connector at the inside front of the frame.
5. Plug-in HD modules and output cards.

All power used by the ZIF circuitry is supplied by the matrix and output board. No power is applied directly to the ZIF connector board itself.

That's it. Cable up the HD sources and destinations. Replacing analog and SD digital video modules with HD modules is just as simple.

Making things better

For broadcast facilities, the addition of the Philips HDVP-3500 HD Video Processor to a Saturn Master Control switcher provides a comprehensive solution for hybrid master control operations where HD, SD and analog channels are

The COBRA system allows current and future Venus owners to mix-and-match signal types within a single frame – analog video, digital video, high definition video, analog audio, digital audio and machine control data.

controlled from a single control position. The HDVP-3500 also works in conjunction with the Philips GS-400 Gigabit router for HD island applications. Broadcasters integrating current systems now have the choice of installing separate HD Saturn and HD Venus systems to operate as an HD island, or integrating the system with an already existing analog or digital Philips system. In addition, the Venus HD modules will be capable of handling signals with data rates less than 100Mb/s for increased flexibility.

The Venus High Definition Modules are scheduled for delivery in early Q1 of 2000. Matrix sizes range from 32x32 to 1024x1024 and beyond.

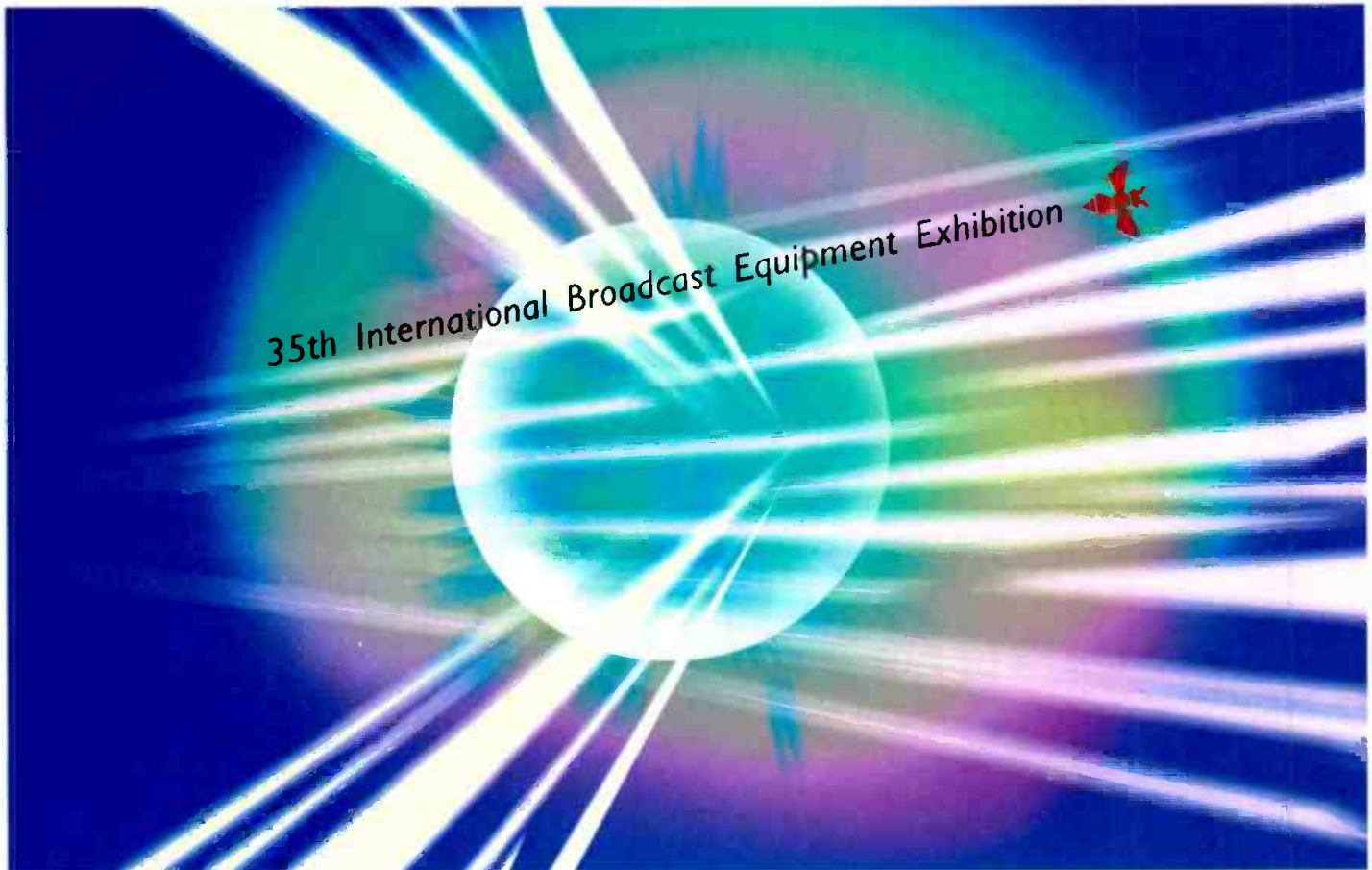
For more information on Philips' Venus routing switcher, circle (451) on the Free Info Card.

Joop Janssen is vice president and general manager of routing and master control products for Philips Digital Video Systems.

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Applied Technology

Pinnacle's Thunder storms the server market

BY PAUL TURNER

With its recent entry into the server market, Pinnacle Systems continues to realize its goal of becoming a comprehensive broadcast industry supplier. The new Thunder family of broadcast and webcast servers includes the MCS 4000 four-channel broadcast server, the MCS 2000 two-channel broadcast server, and the iThunder Internet server for real-time webcasting.

The design goal for the Thunder family was to create a next-generation server architecture that would surpass the capabilities of first-generation systems, including radically expanding the functionality of the video server with new capabilities like picon-based asset management, fully symmetrical operation, and support for multiple compression schemes. Each channel needed to record and play back video and key signal as a standard feature, rather than tying up a second channel for video plus key. The Thunder architecture needed to deliver integration with multifunction broadcast environment, where DV field acquisition and MPEG-2 program distribution are standards.

Thunder's engineering team accomplished these goals by combining Pinnacle broadcast technologies (like Broad-Net connectivity) with leading-edge technologies from other vendors, including C-Cube Microsystems' DVxpress MX-50 codec chip. With its implementation of C-Cube's DV/MPEG-2 chip, Thunder is the first server that can record and playback source material in both MPEG-2 and native DV formats.

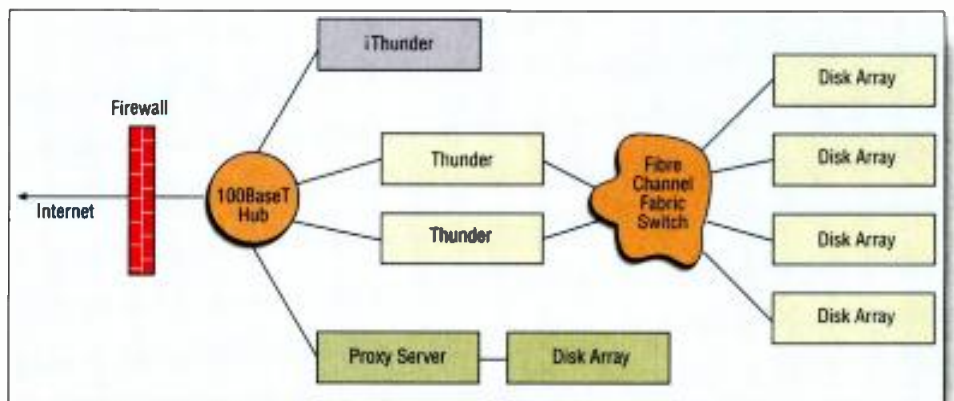
Thunder architecture allows DV and MPEG-2 material and uncompressed still images to co-exist on the same server (and even to play back-to-back on the same channel) without the need to restripe the disk array. Source material in 525 and 625 can also reside on the same server without the need to restripe the array.

The Thunder MCS 2000 and MCS 4000 are completely symmetrical. Any Thunder channel (or combination of channels) can record or play back source material, and the user can freely select the record/playback mode for each channel at any time. During record operations, each channel has access to any of the four system inputs, and each input includes video, key, four-channel audio, timecode and ancillary data. The system can perform concurrent record and playback using any combination of channels.

four hours of video and key. Additional Fibre Channel arrays can be added via off-the-shelf Storage Area Network software, using Fibre Channel hubs or fabric switches.

The video processor and storage chassis are connected via a Fibre Channel link, with an available bandwidth of 1Gb/s. Each chassis offers redundant power supplies and alarms for power supply failure. Redundant storage at user-selectable RAID levels can be implemented easily through additional Fibre Channel drive arrays.

Thunder is designed for plug-and-play



This is a basic four-channel Thunder system. With the addition of iThunder on the network, clips and programming are now available on the Internet. Clips are accessible over the web by copying those clips to iThunder and converting them to RealPlayer format. This gives the capability of streaming video and audio.

In the box

Both the MCS 4000 and the MCS 2000 are dual-chassis systems. In each case, the system's 4RU video processor houses the CPU, video processing electronics, I/Os and networking hardware. Standard I/O is CCIR 601 for video, and AES/EBU for audio. Analog I/O and IEEE 1394 (FireWire) I/O are available as options.

Thunder's storage chassis houses a Fibre Channel disk array. Compression rates are user-selected during the record process, with data rates from 2- to 50Mb/s per channel. At a data rate of 20Mb/s, Thunder ships with storage for about

integration with station automation systems from Louth, Odetics and other vendors. It also offers external control through GPI and RS-422 ports, using the BVW-75 protocol.

Channels are No. 1

A fundamental design goal for Thunder was to provide functionality and power within each channel—so that a single channel of Thunder could deliver capabilities that previously required two server channels. Multiple features accomplished this goal. For example, each Thunder channel stores both video and an associated key signal (i.e. 4:2:2:4

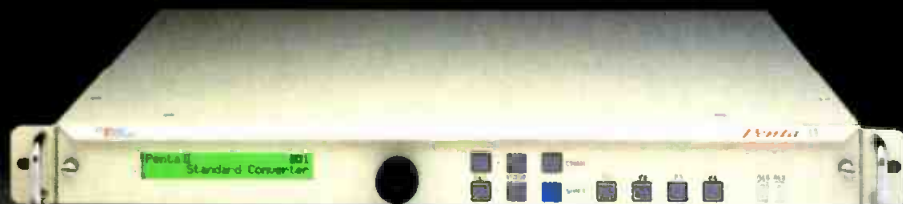
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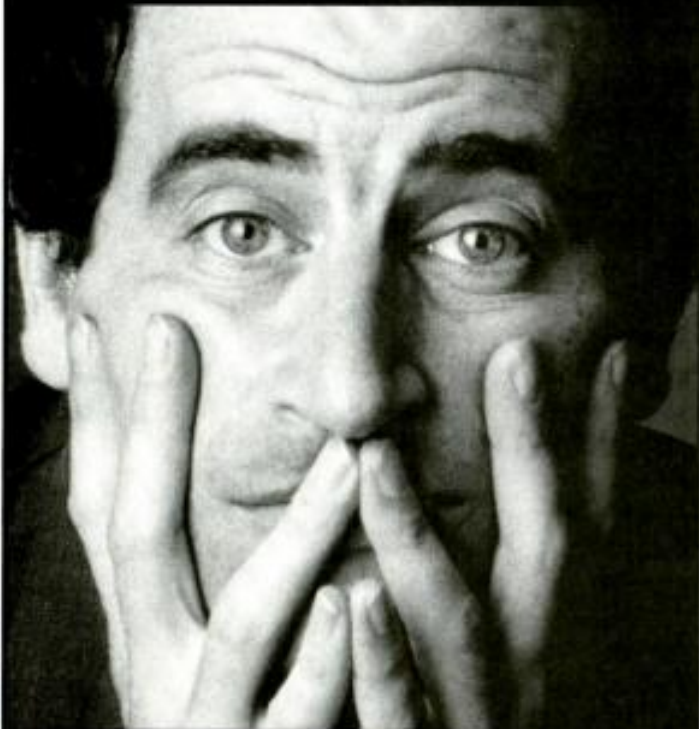
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operation) within a single channel, while older servers require the use of two channels to store video and key signal, if they can do this at all. Each channel also stores four streams of uncompressed 20-bit digital audio, along with timecode and ancillary data.

Thunder's built-in downstream keyer allows for a clip station logo or other element to be keyed over any background input, without a master control or production switcher. When a Thunder channel executes a video transition, it automatically performs a cross-fade on the accompanying audio channels. In addition, each Thunder channel can create real-time transitions between back-to-back clips within a single channel. Thunder can dissolve, wipe and cut between two clips on the same channel, rather than requiring the use of an external switcher to transition between clips playing on two separate channels.

The design goal for the Thunder family was to create a next-generation server architecture that would surpass the capabilities of first-generation systems.

The Thunder user interface builds on the intuitive front-end and powerful asset-management capabilities of Pinnacle's Lightning stillstore family. Like Lightning, the picon-based Thunder interface offers a high-speed database search engine that allows users to locate footage by date, title, category or other user-determined criteria.

Proxy power

One of Thunder's most powerful features is its ability to instantly generate MPEG-1 proxy copies of all source material during its record process. These high-quality, low-data-rate proxies can be stored on the Thunder drive array or on an external proxy server.

Proxies are standard Windows files that can be viewed in MediaPlayer on Windows PCs. With a data rate of approximately 1Mb/s, proxies can be viewed quickly and easily by PC users throughout a networked facility. With Thunder's optional Browse software on networked PCs, users can concurrently access the proxy footage, create their own subclips and even create their own playlists.

Thunder's ability to generate standard MPEG-1 proxies on the fly also allows for webcasting over the Internet when paired with the companion iThunder server. The rackmountable iThunder system integrates the RealSystem G2 video streaming software from RealNetworks.

iThunder makes clip-browsing and playlist creation available over the Internet, allowing authorized users to instantly view and refine projects on desktops—or anywhere in the world. iThunder supports connection rates from T1 to modem rates as low as 28.8k baud. With Thunder and iThunder, broadcasters now have an integrated solution for on-air applications and the Internet. ■

For more information on Pinnacle's Thunder family of broadcast and webcast servers, circle (454) on the Free Info Card.

Paul Turner is new product development business manager at Pinnacle Systems Inc. in Mountain View, CA.

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Applied Technology

Grass Valley Group's ContentShare: global asset management

BY STEVE BILOW

Until now, broadcasters' ability to access media assets was hampered by two major factors: first, content production systems that are isolated by virtue of proprietary and incompatible media storage and media management strategies; second, applications that lack adequate search tools for locating media across a variety of sources. Typically, accessing the content requires that it all reside on compatible storage devices and be controlled through a compatible application. Unfortunately, the ability of disparate applications and storage systems to work together is actually rare.

Managing more than video assets

Digital television has resulted in the use of specialized applications with more media being created and stored digitally. The need to exchange that media via data networks soon becomes critical to a facility's operation. The way to provide access to a variety of media is through a type-independent search and retrieval system.

Tektronix developed the ContentShare software platform to solve these problems. It provides those who write applications with a common language for exchanging a variety of information about diverse media assets.

The ContentShare software platform does not replace any of the wide variety of applications in the broadcast environment or their application-specific databases. It does provide a framework and a set of software components that enable application developers to locate and interchange assets across multiple sites, as well as to create and track links between those assets. The software plat-

System framework

The messaging framework consists of a set of low-level tools that allow the environment to function. The first language tool is called the Knowledge Query Manipulation Language (KQML). The second language tool is Extensible Markup Language (XML). These two language constructs comprise the system share information portion,

Users want systems that can interoperate and provide a unified approach to locating and moving material.

form accomplishes this goal by creating a common language for requesting and providing information.

The ContentShare software platform has its roots in several years of research at Tektronix under a grant from the National Institute for Science and Technology. It is based on a software technology commonly called agents and is referred to as an "agent architecture for media management." This architecture consists of several pieces called components, which fall into four categories: messaging framework, system agents, brokers, and user agents.

and allow cooperative problem solving. This combination system provides location and data format independence.

System agents are those pieces of software that fit into the agent architecture to allow various applications to register data with the system, thus enabling distributed storage with easy cross-platform access. These agents are knowledge agents, called ASK, which give applications a place to register the description of system capabilities (video format, metadata fields, etc.) and resolvers, which manage and store relationships and name services, or ANS, which provide security.

Brokers are the software components that actually provide access to a given application's database. Any application that fits into the platform must have one or more brokers. Brokers handle registration with ASK and also expose the subset of data that is to be made publicly available. A ContentShare application contains brokers that assist with the exchange of assets

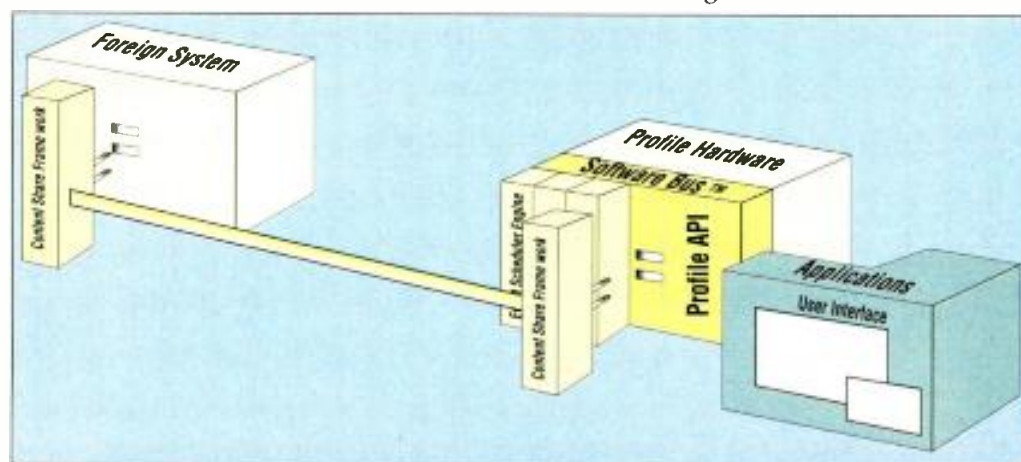


Figure 1: ContentShare integrates tightly with the Profile software architecture while concurrently providing access to a wide variety of applications.

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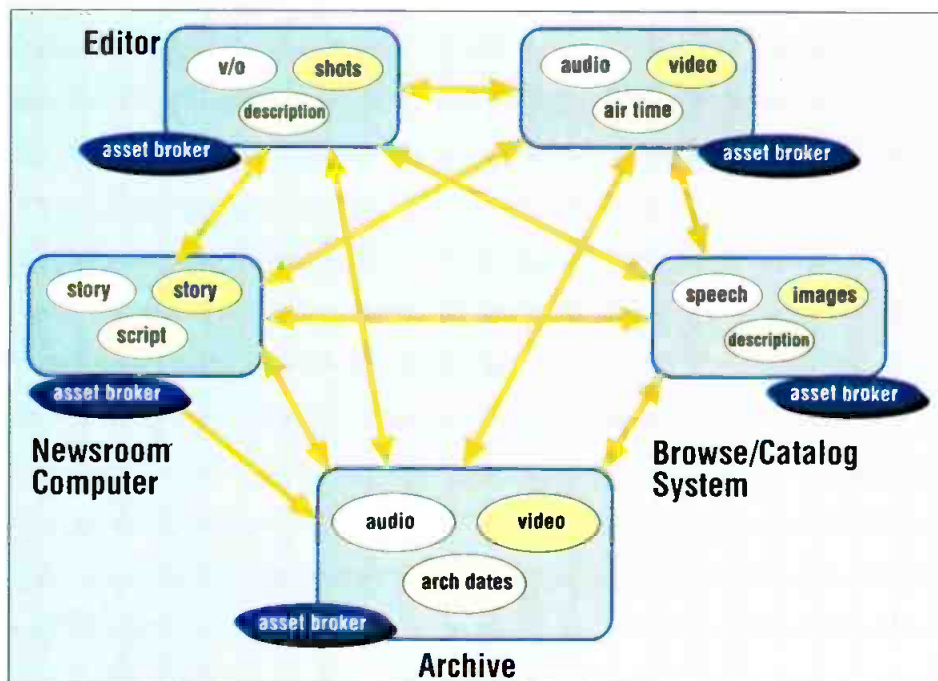


Figure 2: ContentShare brokers allow access to heterogeneous devices across multiple databases.

and their descriptions, query and search functions, and transfer activities.

All of these software elements combined, when used as the foundation for broadcast systems, allow flexibility in broadcast system design. Specialized applications for newsroom automation, acquisition, editing, archiving, traffic

management and sales, station automation and other activities are becoming more prevalent. The system software provides an open platform for the creation of distributed media management applications that both overcomes the need for custom applications and enables cross-platform, cross-application

integration. It does not solve global media management problems at the application level; rather, it makes possible media management applications development with greater flexibility.

Ultimately, broadcast application developers will be required to deal with one another's data in one form or another. Users want systems that can interoperate and provide a unified approach to locating and moving material. This need increases as station groups grow, as consolidations and acquisitions occur and as new networks are created. For those who write applications, the ContentShare software platform will decrease integration time and development costs. For users, there will be unprecedented access to information, more creativity, and faster response to the pressures of the broadcast environment. ■

For more information on Grass Valley Group's ContentShare, circle (452) on the Free Info Card.

Steve Bilow is ContentShare and Profile application programming interfaces product marketing manager and business development manager for Profile application development partners at Grass Valley Group.

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Open Solutions for Digital Television

TeraNex's PixelComp DTV format converter

BY JED DEAME

As broadcasters and post production houses gear up for digital television, the need to use DTV format converters becomes essential. Upconverters solve the problem of not having enough HD material to broadcast. Downconverters enable high-quality SD masters to be derived from HD productions. Downconverters also allow HD signals to be processed in SD facilities. Format converters enable post houses to convert any incoming material to and from their native format. Unfortunately, DTV formats are changing so rapidly that the initially deployed converters are quickly becoming obsolete. New production formats such as 1080p24 are not supported by many of the current generation DTV format converters. Many of the hard-wired, nonreconfigurable converters are not easily adaptable to the new formats.

One solution to this problem is to implement DTV format conversion in a programmable, software-based system. This capability exists today in ultra high-end computer workstations; however, those systems are not capable of performing the conversions in real time, due to the tremendous computational requirements of DTV format conversion. High-quality DTV format conversion requires hundreds of billions to trillions of operations per second. Massively

parallel multiprocessor systems are clearly required to handle that magnitude of processing load.

GAPP technology

Technically, GAPP (Geometric Arithmetic Parallel Processor) is a massive parallel super-computer organized in a two-dimensional single instruction multiple data (SIMD) architecture. Traditionally, SIMD systems have been large and expensive, but due to recent advances in semiconductor and processor technology, highly efficient SIMD systems are now practical to implement in compact 19-inch rack mount units. TeraNex has packaged GAPP technology in a 6RU rack mount black box that provides a reconfigurable platform supporting all existing and emerging format conversions using the highest possible quality algorithms. The result is a DTV format converter that can adapt to new formats and processing techniques as fast as they evolve.

De-interlacing and resampling

The most important feature of a format converter is image quality. Image quality is driven by two variables: the quality of the de-interlacing algorithm and the quality of the resampling algorithm. Ultimately, the final quality of the videostream is dependent upon the type

and the refinement of the image processing algorithms that are applied to it. For instance, with respect to upconversion from 480i to 720p, the first and most complex step is to convert the interlaced image to progressive (480p). This is necessary because the odd lines of the image are spatially shifted from the even lines, due to inter-field motion. (See Figure 1A.) Note especially the double images of the sheep's eyes. This is due to camera motion in interlaced TV systems. This field offset must be dealt with in order to create visually pleasing progressive images. Once a clean 480p image is created, it may then be resampled to the desired new image format.

There are three basic methods for de-interlacing an image. The first type of de-interlacing algorithm is field interpolation. Here, every other line of the input image is discarded, reducing the image size from 720x486 to 720x243. The 1/2 resolution image is then resampled to the desired HD image size. The results of this process are shown as Figure 1B.

The second de-interlacing method is motion adaptive. In this method, the amount of inter-field motion is measured and used to make the decision of whether to use the entire input frame (in the case where there was no inter-field motion), or discard one field (in the case where there was significant



Figure 1. 3x-zoomed image upconverted from 480i to 720p. Original odd lines are spatially shifted because of inter-field motion (A). Results of field interpolation (B) show an oblong shape of the sheep's eyes, indicating the loss of resolution. Motion adaptive conversion produces a higher quality image (C) than field interpolation on stills; however, double images can result as shown. Using TeraNex's PixelComp process (D), de-interlacing measures the inter-field motion and properly realigns the data between fields. The result is improved resolution. Compare this image quality (noting especially the round sheep's eyes) against that of the other methods.

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Broadcast graphics systems: Where the PC workstation drives the show

BY DOUGLAS GRANT

The modern desktop PC workstation, appropriately equipped and configured, is amazingly powerful in its ability to rapidly create and display graphics from either user input (mouse, tablet, keyboard) or from dynamic data feeds (news, weather, financial or sports). The availability, affordability and ease of use of common PC work-

stations account for their popularity. Such systems are responsible for a good share of graphics creation or playout in today's TV facilities.

firmly clamped in place, or just plugged in like desktop computer systems? Vibrations can cause boards to loosen and affect performance.

- Does the system have dual power supplies? If so, you have a back up already in place if brown outs or PS failure occurs.
- What type of connectors are used?

- Does the system recognize illegal colors?

- Determine system resolution. An Alpha or Key channel may require 32-bit processing to provide the alpha channel for graphics overlay. Not all systems provide this level of resolution.

- Aspect ratios. Does your application require 16:9 operation? If so, can the graphics system easily switch between that and 4:3?

- Is the software mouse centric? While operators can do anything with a mouse, it's never as fast as single keystrokes. Look for productivity and flexibility features including keyboard shortcuts and a logical shortcut layout.

- What other I/O devices are supported? Can you use graphics tablets and remote shuttles?

Both high-end and lower-cost systems have their advantages, but you get what you pay for.

How do you decide which broadcast graphics system is right for you? Careful selection of features is crucial to getting the right platform and software. Both high-end and lower-cost systems have their advantages, but you get what you pay for.

To add further confusion, some popular mass-market graphics programs appear attractive for broadcasters looking for an economical graphics solution. However, close examination reveals that such programs may not deliver the functionality required for broadcaster applications. Some products provide platform-based solutions that combine broadcast graphic software and standard PC core hardware with specialized video processing hardware in broadcast-environment-friendly rack-mount configurations. Such systems may deliver a good combination of performance, features and cost for many broadcast applications.

Consider these key points:

- Is the system based on delicate pieces of equipment or a piece of rugged video gear? Are the PC boards

Look for BNCs, not RCA plugs. A BNC is the standard professional video connector; RCA plugs are not.

- Do a feature check for your application. Can the system do what you need

The ability to upgrade to HD, while possible with many of today's systems, might better be accommodated with an entirely new system as hardware costs drop.

to do in a way that's convenient for your operators? For instance, can you paint to video? This lets you edit your images online to make any necessary last-minute changes.

- Determine the system's output signal format. If the graphics platform outputs SDI today, can it be upgraded to HD tomorrow?

- How about single frame capture? It's often useful to be able to store one or more frames of video for later use as background.

- Video frame buffering allows an artist to accurately preview the work before it goes to air.

- Speed is difficult to determine, but needless to say, broadcast applications require fast updates and the provision for last-minute changes. Is rendering required? Can you tolerate a delay in broadcast situations?

- External data interfaces. Can the system interface with automated data service feeds. This is particularly important for news, weather, sports and election applications.

- Does the system support full 3D graphics?

- What expansion options exist: RAM, additional processors, external drives and storage, additional I/Os?



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Your selected system should last three to five years. If your facility will broadcast DTV in that timeframe (and who won't), system upgradeability is important. While NTSC operation is adequate today, you'll need SDI soon and shortly the ability to do both 4:3 and 16:9. The ability to upgrade to

HD, while possible with many of today's systems, might better be accommodated with an entirely new system as hardware costs drop. It could be possible to purchase a new system for not much more than upgrading your current system.

Fortunately, today's PC-based broadcast graphics systems offer un-

precedented functionality and performance. All you have to do is keep in mind the above key factors as you consider what system would best meet your needs. ■

Douglas Grant is marketing coordinator for Inscribe Technology, Waterloo, Ontario, Canada.

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Listen to lead

BY KARE ANDERSON

In a time-pressed, relationship-diminished world, you can demonstrate a caring attitude easier through compassionate, complete listening than through talking or even asking questions. Yet we are so rushed that slowing down to listen — without interruption — is an increasingly rare occurrence. You'll really stand out when you do. Seeing the rewards of listening may help you become motivated to practice the stillness required.

I admit that what I'm proposing here is often hard for me to practice. Learning to listen is more difficult than learning to ask good questions, but there are rich and immediate rewards for being a thoughtful listener. With less stress and

tion is to perceive that other people mean the same thing that we would mean if they say or act a certain way.

Research shows that Americans are more likely to trust and support a new kind of leader who exhibits strong listening and action skills. Unlike the John F. Kennedy model of charismatic leadership that worked in the past, people find other kinds of behavior and group interaction more satisfying and inspiring.

Here is a summary of behavioral traits for you to consider:

1. Go slow to go fast.

At the beginning of every task or interaction, do everything lower and slower to get in sync and establish a common

5. Synthesize the best.

Listen, ask, ask more, then synthesize others' ideas as a way of proposing new action.

6. Give third-party endorsements.

Offer specific, genuine praise for others' contributions from anywhere in the company; praise them to those who are important to them and in ways that reflect their highest self-image and values.

7. Walk your talk.

Demonstrate a congruency in all that you do; make and keep agreements; reflect a clear set of core personal values that people can trust you'll keep, regardless of whether they share those values.

I always enjoy getting your e-mail reactions to these columns and your ideas of communication-related topics to cover in future columns, so please share them at kareand@aol.com. I'll answer each e-mail, not just to practice good e-mail listening but because your feedback is fascinating.

For more ideas about listening, consider reading one of these well-written books on the topic: *Listening — Forgotten Skill* by Madelyn Burley-Allen; *Active Listening: Building Skills for Understanding* by Marc Helgesen; *The Art of Listening* by Fromm; *Between People: Communicating One-to-One* by John A. Sanford; *Changing the World, One Relationship at a Time: Focused Listening for Mutual Support & Empowerment* by Sheryl Karas; *Dealing with Someone Who Won't Listen* by Lisa K. Adams; *From the Listening Place: Languages of Intuition* by Margaret Blanchard; *Getting the Picture: Everyday Listening/Speaking with Idioms* by Nancy Herzfeld-Pipkin; and *How Will They Hear if We Don't Listen?* by Ronald W. Johnson. ■

Listening may seem like a passive task, but, in fact, it requires more mental and emotional energy to do correctly than speaking.

energy on your part, you naturally bring others closer when you listen because speakers feel heard when they observe your open expression. By fact gathering in listening, you can confirm what you have most in common with those people, in that moment. Only then can you consider where to build bridges to deeper relationships.

In a crowd of active speakers, you may feel left out or shunted aside when you speak less, but if you wait until others speak first, you can propose your suggestions or ideas as specific extensions or examples of what others have already said is important to them.

Quieting the chattering mind promotes directed action

Listening may seem like a passive task, but, in fact, it requires more mental and emotional energy to do correctly than speaking. Why? Because our gut reac-

direction and involvement. When you pick up speed later on, everybody is eager to be on board.

2. Create the common vision.

Vividly characterize the listener's direct benefit up front, even if it is a part of his or her job anyway. Then characterize how the expected support directly relates to one of the top goals of your organization, the up side and down side of doing the work.

3. Play straight.

Announce the rules up front — penalties and rewards for participation in a team activity, project or job — and don't change them in midstream without a compelling reason.

4. Play it back.

Seek and reward candid feedback on an ongoing basis. Respond specifically and soon to what you've been told, including the rationale about the action you will or will not take, based upon that feedback.

Kare Anderson is a speaker and author.



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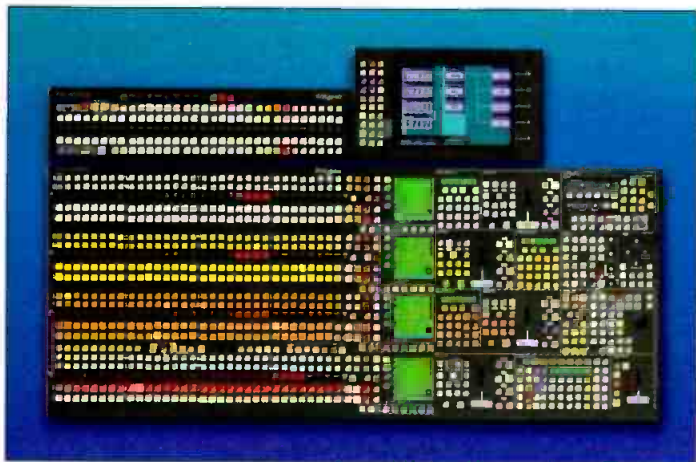
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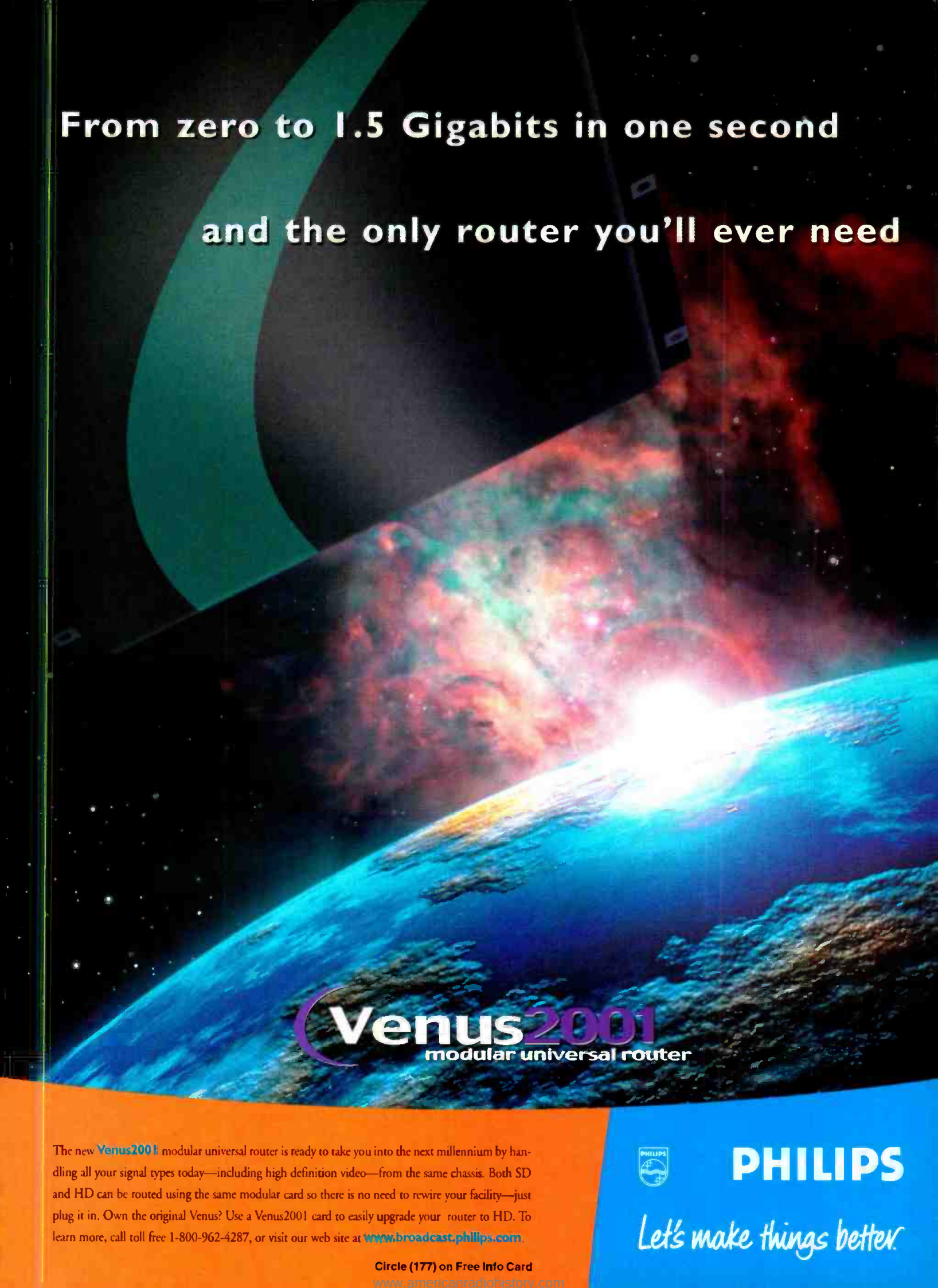


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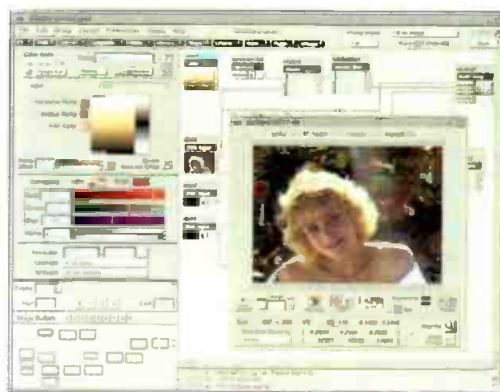
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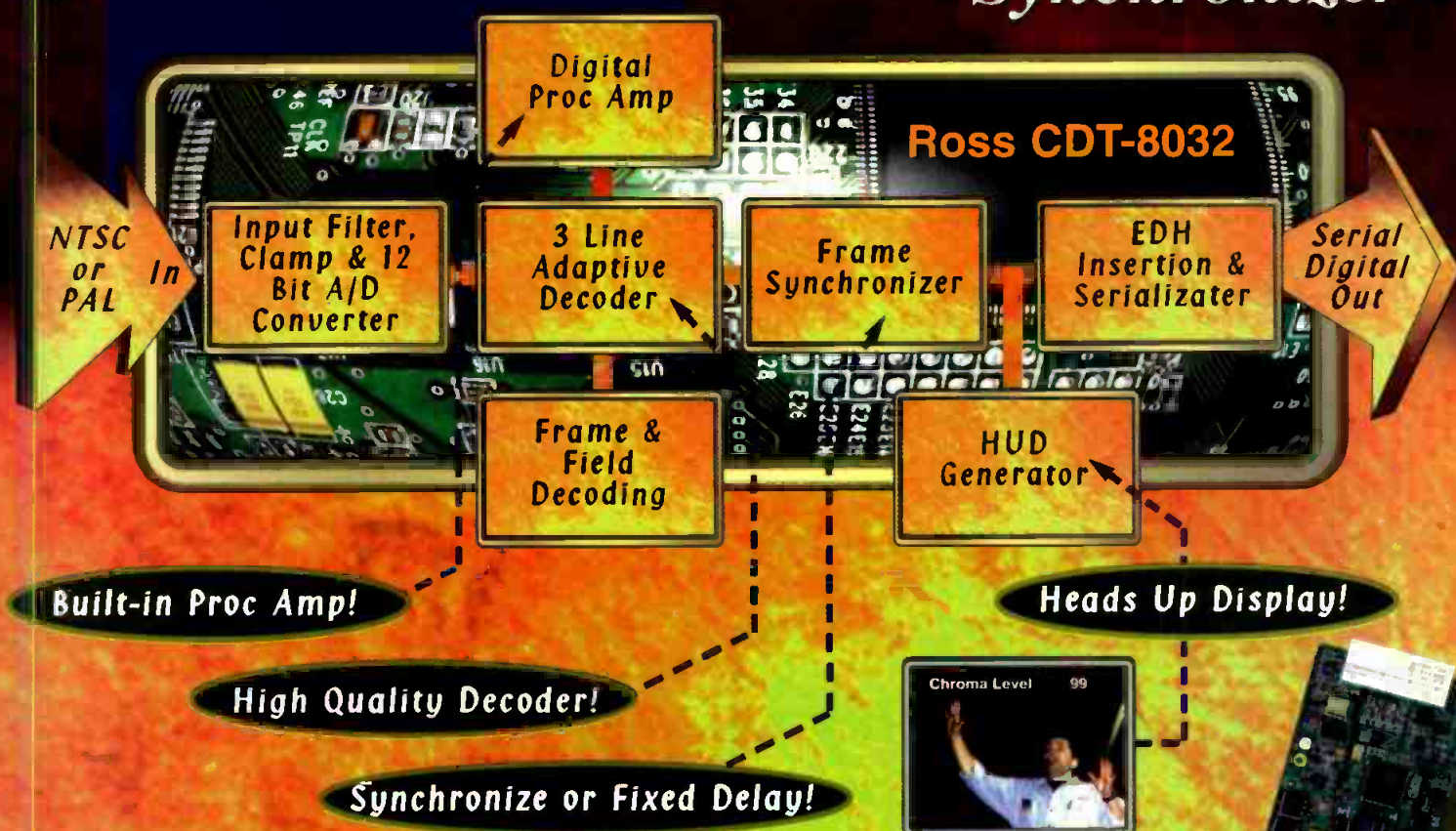


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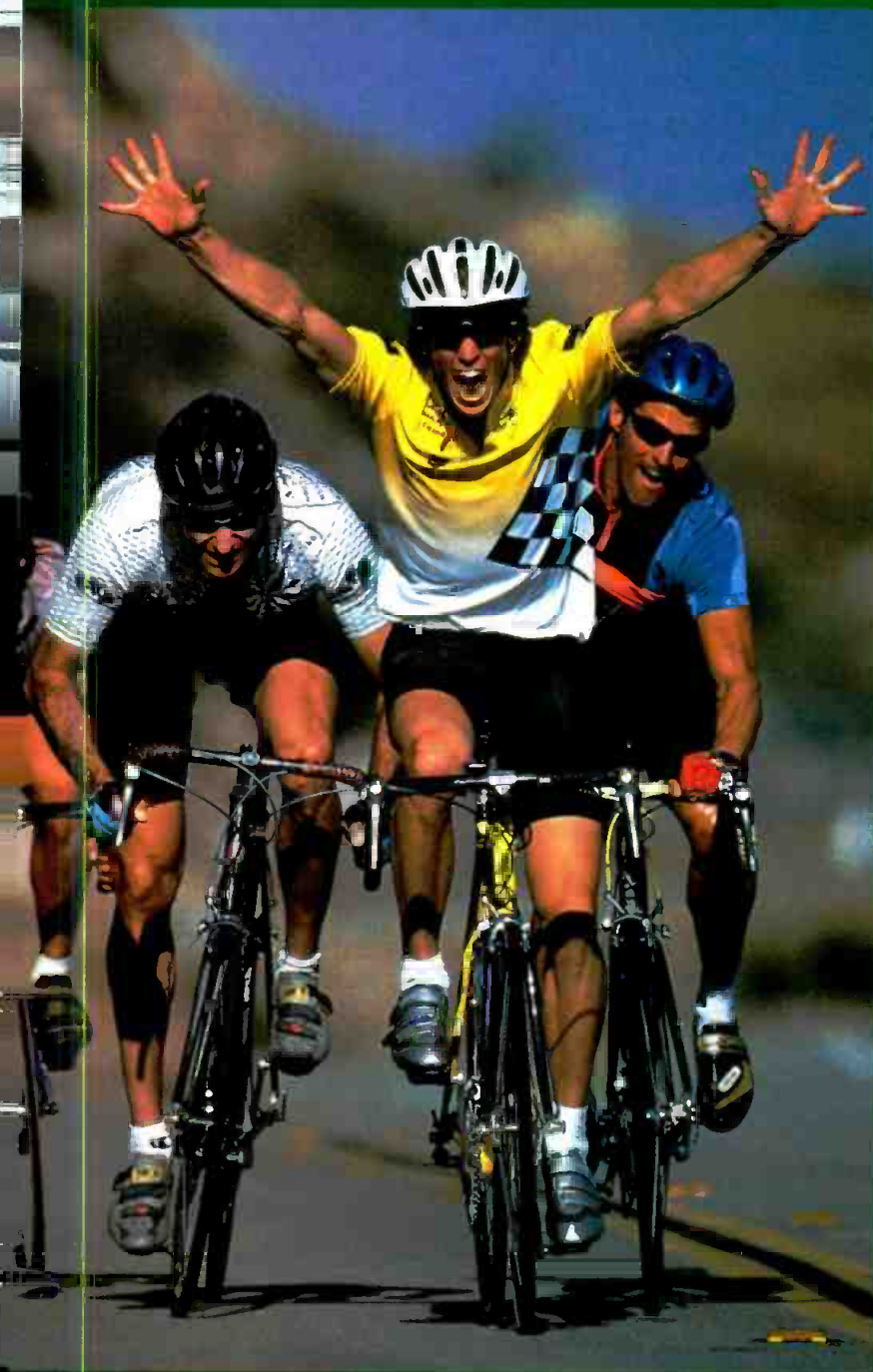
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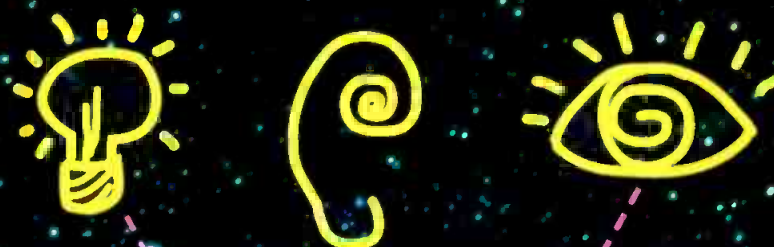
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abling process that allows broadcasters and post houses to gradually shift to digital television without abandoning their current investments in SD equipment. Unfortunately, the flexibility inherent in DTV systems creates the requirement for a format converter that can grow with the needs of the facility. The conversion process itself is quite complex and, if not handled properly, can result in poor image quality.

The TeraNex SIMD technology, applied to DTV format conversion, addresses both of these problems. The reconfigurable nature of the internal SIMD processor array allows software updates to add new formats, features, functions and improved quality algorithms via a CD-ROM. In addition, the one TeraOp throughput of the system enables the finest motion compensated de-interlacing algorithms to be applied to the video signal. This ensures that the HD outputs are truly high-definition. ■

For more information on TeraNex's PixelComp, circle (453) on the Free Info Card.

Jed Deame is DTV product manager, TeraNex Inc.

TeraNex format converters implement an enhanced version of motion compensation called PixelComp.

ble images, when too much uncorrelated previous field information is used, and lost vertical resolution, when not enough is used. Another challenge in varying the temporal aperture is doing so in a manner that avoids resolution pumping as objects start or stop moving. The processing requirements for motion adaptive de-interlacing are higher than that of field interpolation, but the result is somewhat higher output image quality (Figure 1C).

The third and most advanced method of de-interlacing is motion compensation. This technique, often used in ad-

lution of the imagery even when significant motion is detected. TeraNex format converters implement an enhanced version of motion compensation called PixelComp, which includes advanced techniques for filtering motion vectors to ensure their accuracy. The results of the PixelComp process are shown as Figure 1D. Compare the roundness of the sheep's eyes in this photo with that in Figure 1B and in Figure 1C. Note the improvement in image accuracy.

Benefits of format conversion

DTV format conversion is an en-



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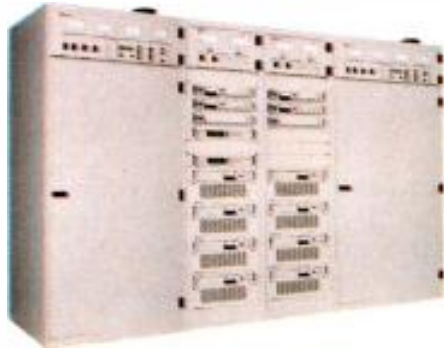
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Business highlights from broadcast and production

BY SANDRA FERGUSON, EDITORIAL ASSISTANT



DVCPRO equipment. KJRH-TV in Tulsa recently purchased more than \$1 million of DVCPRO equipment.

KTVT-TV in Ft. Worth recently purchased 12 **Avid** NewsCutter Effects Model digital nonlinear editing systems and two **Tektronix** Profile PDR400 video servers.

ADC Telecommunications announced that KM Communications chose the company to supply a dual-tube 140kW inductive output tube (IOT) transmitter for its Iowa City UHF TV station.



Birns & Sawyer expanded its line of lenses to include **Canon's** EJ6mm, 10mm, 15mm, 24mm and 35mm lenses.

Several markets have purchased or ordered **Wheatstone** consoles: WOWT-TV in Omaha purchased a TV 1000; WCCB-TV in Charlotte and WCYB-TV in the Johnson City/Bristol/Bridgeport TN/VA area ordered TV 80s and KBTX-TV in Bryant, TX, purchased an SP-8 console.

Time Warner selected **Chyron's** Duet/Duet HD platform integrated with **Nexus** ASA Group's NewsMaker StarDrive/OpenMedia as its graphics and effects solution for News 8 Austin.

WDSU-TV in New Orleans purchased a substantial amount of **Panasonic**

Tektronix announced the Grass Valley Kalypso Video Production Center line for controlling teleproduction environments.

Hewlett-Packard's new diversified technology company is called **Agilent Technologies**. Agilent's headquarters is located in Palo Alto, CA, at 395 Page Mill Road.

Visuality Media Productions of Madison, WI, selected **JVC's** DIGITAL-S as its in-house videotape commercial and multimedia production format.



Direct 2 U purchased four **Hitachi** Z-3000W digital 16:9/4:3 switchable cameras with Hitachi's new RU-Z3 camera control unit for the company's new studio in Bucks County, PA.

Fourteen CBS stations are using **Artel Video's** HD routing and control system for broadcasting HD. CBS will broadcast an extensive line up of prime time TV series programming in HD for the 1999-2000 TV season with Artel's UTAH 1500 HD router and Mini Master control panel.

Three ACME Broadcast TV stations installed **Sundance Digital's** FastBreak commercial insertion solution. The stations include WTVK in Naples, FL, WBDT in Dayton and KPLR in St. Louis.



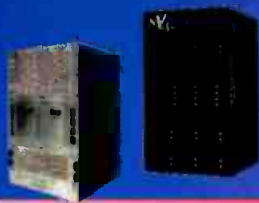
Videotek received an engineering Emmy award on July 8. The award was for its VTM-200 multifORMAT on-screen monitor.

The WB television network installed a second 64-input **Solid State Logic** Axiom digital console in its Burbank post production facility.

Quantel and **Alias/Wavefront** announced the details for a technology partnership to further develop the integration between their 2D and 3D environments. As part of the agreement, Quantel will OEM Alias/Wavefront's Maya Unlimited software application for implementation on its Open Render Engine technology.

Fox Sports Net invested in a **Storage-Tek** broadcast archive solution for its regional operation center in Houston.

KOMO-TV in Seattle recently purchased **Fujinon** HD lenses for its HD broadcasts. The purchase included the



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The ENVOY family of universal digital video routers manages a wide range of signal formats. ENVOY is capable of routing both standard rate SDI and HD-SDI signals within the same frame, at the same time. ENVOY routers can pass pathological signals at both SDI and HD-SDI data rates. Input and output modules include SDI (143, 177, 270, and 360 Mbits) and HD-SDI (1.5 Gbit). In addition, the design ensures that no signal inversions take place on the primary outputs; for systems handling DVB-ASI data streams, this is essential. (DVB-ASI is NRZ coded and cannot be inverted.) A mix of SDI and HD-SDI I/Os can be included in the same switch.

- Simultaneous Routing of SDI and HD-SDI Signals
- Handles 1.5Gb Data Rates
- Passes Pathological Signals without Bit Errors
- Reclocking and Cable EQ
- Compact Frame Sizes
- Expansion From 8 x 8 to 256 x 256 in 8 Input or Output Increments (256 x 256 requires two ENVOY 6256 + input DAs)
- Modules Load Via the Front of the Frame
- Modules can be "Hot Swapped" (No need to power down the frame)
- Dual Output Connectors Reduce DA Requirements
- Optional Redundant Power Supplies
- Controllable by Most Existing Control Systems

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18RU frame to accommodate up to 128 x 128 with dual outputs

ENVOY6256

29RU frame to accommodate up to 256 x 128 with dual outputs

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first sale of Fujinon's HA26x6.7ESM studio lens.

KSL NBC-5 in Salt Lake City selected **THOMCAST** for its new digital TV transmission system. WRAL-TV in Raleigh and WRAZ-TV in Durham purchased DiviCom encoding systems, including MV-400 HD and MV-40 SD encoders, the Pearl PSIP Manager and Opal Data Broadcasting Gateway.

National Mobile Television recently purchased \$270,000 of **Grass Valley** HD distribution amplifiers.

Accom announced that Turner Sports chose Accom's APR. Attache digital disk recorder as its travel remote digital disk graphics device for use on Turner's 1999 NBA regular season and playoff telecasts.

PESA Switching Systems announced the delivery of two large wideband analog video routing switchers to AT&T's \$91 million Global Network Operations Center in Bedminster, NJ.

Seattle/Portland ABC affiliates KOMO-TV and KATU-TV selected **Ampex DST's** 312 digital tape drive to archive commercial material and free up space on video servers.

KSTP-TV in Minneapolis/St. Paul recently purchased a **Harris** Platinum Series solid state transmitter. Harris sold its new UniCoder HD encoding system to WWJ-TV in Detroit, WBBM in Chicago and WBZ in Boston.

Keywest Technology and **James Grunder & Associates** announced their business combination, effective July 30, 1999. The combined organization will be known as **Keywest Technology Inc.**

Image Precision International and **Brimar Limited** have formed a new company named **POSTware**. The new company will develop advanced data solutions for post production facilities.

National Video Center/Recording Studios Inc. announced the establishment of **National/Atlanta AUX-TV**, a facility-based design/production company.

Sony received a 1999 Engineering

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Standard's new MT930B is the perfect upgrade to one of the most popular multi-format agile satellite receivers in history — Standard's MT830 series.

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Emmy award for its HDCAM HD VTR. KRON-TV in San Francisco recently used Sony HDW-700A HDCAM camcorders to document the arrival of historic tall ships to San Francisco Bay for the 150th anniversary of the California Gold Rush.

People

Charles Steinberg, who retired on June 30 as president of Sony's Broadcast and Professional company, received an Engineering Emmy award for lifetime achievement.

Dennis Speck was promoted to chief engineer for KSPR-TV in Springfield, MO.



Thomas E. Newman

Itelco USA announced that **Thomas E. Newman** joined its staff as director of sales and marketing.

THOMCAST announced the recent appointment of **Wayne R. Hoffman** as vice president of engineering.

Euphonix engineer **Elmo Ponsdomech** received an Emmy nomination for outstanding sound mixing for a drama series for his work on *NYPD Blue*.

MetaWave recently appointed **Adrian Braine** as director of engineering. ■

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Screen Shot

WNDU looks ahead to HD with Ikegami

WNDU-TV in South Bend looks ahead to HD with its purchase of four Ikegami HKD-790D studio/field cameras. Besides being on the set for newscasts, the HDK-790D's will also be shooting for WNDU's video production company, Golden Dome Media. Floating between studios for a wide variety of applications, the cameras will make an impact for syndicated programs and live on the air. The station can work in every production format using the HDK-790D studio/field cameras and the HDK-79D portable companion cameras.

Screen Shot

Panasonic's D-5 format used to produce digital cinema version of *Star Wars: Episode 1 — The Phantom Menace*

Panasonic announced that its D-5 HD equipment played a vital role in the post production and playback of the digital projection version of Lucasfilm's recent *Star Wars: Episode 1 — The Phantom Menace* episode. The D-5 format was used in the production of the digital master of the film and Panasonic's AJ-HDP500 HD processor was teamed with Pluto Technologies' hard disk-based HD digital video recorder for playback of the HD images at four *Star Wars* test cinemas.

Screen Shot

Orad's CyberSet E creates lunar surface for Discovery Channel Canada's *One Small Step*

Orad announced that its CyberSet E virtual set system was used to create a realistic lunar landscape for Discovery Channel Canada's special *One Small Step: The Legacy of Apollo 11*, broadcast on July 20. Commemorating the 30th anniversary of humankind's first walk on the moon, Orad's pattern recognition technology made it possible to create a set allowing program hosts Jay Ingram and Gillian Deacon to stand in the middle of a lunar landscape. With Orad's pattern recognition technology, it was possible not only to create the set, but to do so using the Discovery Channel's existing camera infrastructure.



Screen Shot

WBGU-TV future-proofs with Ikegami's HDK-79D cameras

Phasing out of NTSC into HD just got easier for WBGU-TV (PBS) in Bowling Green, OH. The station recently purchased three new Ikegami HDK-79D HD cameras capable of strong performance in both NTSC and HD. The camera's 2.2 million pixel 2/3-inch CCDS provide selectable native-interlace and native-progressive read out modes to enhance performance when switching between 1080i, 720p and 480p. WBGU feels Ikegami has allowed it to future-proof in its transition to digital.

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The Internet for Broadcasters

This book covers the effects of the Internet on broadcasting. The content includes technology and management articles, case studies, and a directory of Internet resources, which lists Web sites and e-mail addresses for equipment suppliers, services, information sources and organizations, as well as newsgroups and search facilities of interest to broadcast, video, and audio professionals. Paperback, 92 pp. ISBN #0-95178-267-3.



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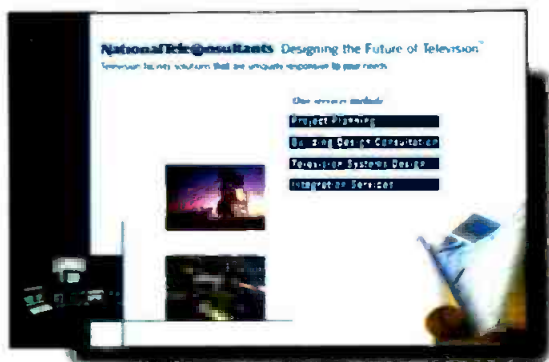
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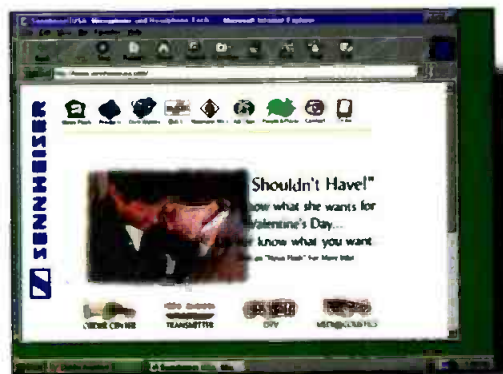
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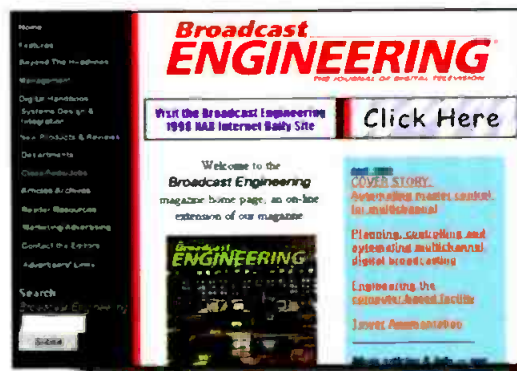
www.technicalpress.com

Technical Press is a web-based reference site that supports more than a dozen video engineering books, including *DTV: The Revolution in Electronic Imaging*. Also available are articles on digital video technologies and applications, and a detailed series on the history of broadcast engineering.



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Broadcast Engineering: *Broadcast Engineering* is the only technology-driven online magazine in the industry. Its editorial environment delivers practical, informative articles on digital technology, systems integration, management, how-to installation, and systems and equipment maintenance. It is a package geared toward TV stations, cable/telcom, production, post-production, business TV, satellite and interactive television.



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DSR-200A 3-CCD Digital (DVCAM) Camcorder



Combining a compact and lightweight body with the superior picture quality of DSP (Digital Signal Processing) and the DVCAM format, the DSR-200A is the ideal acquisition tool for video journalists, event and wedding videographers, stringers and production houses. 500 lines of horizontal resolution, 48kHz or 32kHz digital audio, three hour record time, and minimum illumination of 3 lux is only the beginning. Other features include 16.9/4.3 capability, Steady Shot, high resolution 1-inch viewfinder, time code operation, time/date superimposition and an IEEE-1394 interface for direct digital output. Offers full automatic as well as manual control of focus, iris, gain, white balance and shutter speed.

- Variable servo 10X optical power zoom lens goes from 5.9 to 59mm in 1.7 to 24 seconds. The manual zoom rocker is continuously variable right up to where the digital 20X zoom kicks in.
- Sony's Super Steady Shot reduces high frequency camera shake without compromising image quality. SteadyShot uses horizontal and vertical motion sensors that allow it to work accurately while zooming, moving (even shooting from a car), and shooting in low light conditions.
- Has digital effects including audio and video fade, overlap and Slow Shutter.
- Automatic and manual focus, iris, shutter, gain and white balance. Iris is adjustable in 12 levels from F1.6 to F11, shutter from 1/4 to 1/10,000 of a second in 12 steps. Gain from 1dB to 18dB in 8 steps.
- Zebra Pattern indicator, built-in ND filter.
- Custom preset function lets you preset, store and recall custom settings for color intensity, white balance (bluish or reddish) sharpness and brightness.
- Stores Photo, Date/Time, Shutter Speed, Iris, Gain and F-stop for easy recall. So if you have to re-shoot, you know your original settings for every scene and frame.

- Records Drop/Non-Drop Frame time code. Time code can be read either as RC time code or as SMPTE time code.
- Has a large 1-inch B&W viewfinder with 550 lines of resolution for easy focusing even in low contrast lighting situations. Separate information sub panel displays time code, battery time, tape remaining and other camcorder functions without cluttering up the viewfinder.
- Records 16-bit/48kHz audio on one stereo track or 12-bit/32kHz with two pairs of stereo tracks (L1/R1, L2/R2), so you can add stereo music or narration.
- One-point stereo electret condenser mic for clear stereo separation. Directivity can be selected from 0°, 90° & 120°.
- Automatic & manual (20-step) audio level record controls. Monitor audio with headphones or from the LCD panel which has an active VU meter.
- XLR input connectors for mics and audio equipment.

DSR-200A Field Package:

- DSR-200A Camcorder • NPA-1000/B Battery Case Adapter
- 3 NP-F930/B 7.2v 4000 mAh Batteries
- AC-V900/B AC Adapter, Triple Battery Charger
- VCT-U14 Tripod Adapter • LC-2000CP System Case

DSR-20 DVCAM Player/Recorder

The DSR-20 is a versatile DVCAM VCR with a very compact chassis and a variety of convenient functions for recording, playback and simple editing. It features auto repeat playback, power-on recording/playback, multiple machine control interfaces, AC/DC capability and i-Link (IEEE1394) input and output. And of course, it offers the stunning image and sound quality inherent to the DVCAM format.

DVCAM Quality

- Utilizing the DVCAM format, the DSR-V10 provides the recording/playback quality and reliability required for professional use. It can also play back consumer DV format tapes without any special adapter.
- Provides two selectable audio modes: a two channel mode with 48 kHz/16-bit recording and a four channel mode with 32 kHz/12-bit recording.
- Dual-tape cassette mechanism accepts both mini size (up to 40 minutes) and standard size DVCAM tapes (up to 184 minutes) without an adapter.

Editing Capability

- Equipped with Control L interface, the DSR-20 can perform simple time code-based editing when connected to another DSR-20 or other similarly equipped VCRs/cameras like the DSR-10, DSR-200A or DSR-PD1. When using the FXE-120 or ES-3 EditStation System, the DSR-20 can serve as a feeder player.
- Has DV (IEEE1394) input and output. When connected to other DV equipped machines, the DSR-20 offers digital dubbing of video, audio and data, without any deterioration of image and sound quality. In addition, in the "Digital dubbing including TC copy" mode, full information of video, audio and time code of the original tape can be copied to another tape. Especially useful when making working copies of the original.

Record/Playback Functions

- Automatic repeat function for repeated playback. After reaching either the end of the tape, the first blank point or the first index point, the DSR-20 automatically rewinds the tape then starts playing back the segment again.
- Power-on recording/playback capability for uninterrupted

automatic VCR operation. When connected to an external timer and the VCR's TIMER switch is set to REC, the DSR-20 starts recording as soon as power is turned on. Likewise, when the TIMER is set to REPEAT, the VCR goes into Auto Repeat mode and starts playing back the moment power is turned on.

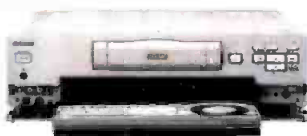
- In addition to Control L, the DSR-20 also incorporates a Control S and RS-232C interface for remote control operation. Basic VCR functions can be controlled from a PC via RS-232, while Control S allows control via the optional DSRM-10 Remote Control. In addition, with the Control S input/output connector, two or more (up to 50) DSR-20's can be daisy-chained and controlled from one DSRM-10 Remote Control.

- External sync input enables synchronized playback with other VCRs. Especially important in A/B roll configurations.

Conveniences

- The DSR-20 is powered by AC or DC. Ideal for mobile applications, the DSR-20 can be connected to a 12V power supply like a car battery or battery belt & powered via the 4-pin XLR DC input.
- Can perform searches for Index Points, which are recorded on the tape as "in-point" marks everytime a recording starts. The DSR-20 can also search for photo data recorded on a DVCAM cassette by the DSR-PD100/200A/300, or where the recording date has been changed.
- Supplied with the RMT-DS20 Wireless Remote for control of basic VCR functions. And again, when two or more VCRs are connected via Control S, they can be simultaneously controlled from one wireless remote by simply sending one command to the master deck.

DSR-30 DVCAM Digital VCR



The DSR-30 is an industrial grade DVCAM VCR that can be used for recording, playback and editing. DV standard 4:1.1 sampling digital component recording with a 5:1 compression ratio provides spectacular picture quality and multi-generation performance. It has a Control L interface for editing with other Control L based recorders such as the DSR-200A DVCAM Camcorder or another DSR-30. It also has a continuous auto repeat playback function making it ideal for kiosks and other point of information displays. Other features include high quality digital audio, IEEE-1394 Digital interface and external time recording. The DSR-30 can accept both Mini and Standard DVCAM cassettes for up to 184 minutes of recording time, and can playback consumer DV tapes as well.

- Records PCM digital audio at either 48kHz (16-bit 2 channel) or at 32kHz (12-bit 4 channel).
- Equipped with Control L, the DSR-30 is capable of SMPTE Time Code based accurate editing even without an edit controller. Built in editing functions include assemble and separate video and audio insert.
- By searching for either an Index point or Photo Data recorded by the DSR-200A camcorder, the DSR-30 drastically cuts the time usually required for editing. The DSR-30 can record up to 135 index points on the Cassette Memory thanks to its 16k bits capability.
- Audio lock ensures audio is fully synchronized with the video for absolute precision when doing an insert edit.

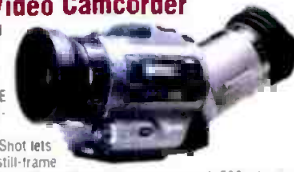
- Built-in control tray has a jog/shuttle dial, VCR and edit function buttons. The jog/shuttle dial allows picture search at 1/5 to 15X normal speed and controls not only the DSR-30 but also a player hooked up through its LANC interface.
- DV In/Out (IEEE 1394) for digital dubbing of video, audio and data ID with no loss in quality.
- Analog audio and video input/outputs make it fully compatible with non-digital equipment. Playback compatibility with consumer DV tapes allows you to work with footage recorded on consumer-grade equipment. Tapes recorded in the DSR-30 are also compatible with Sony's high-end DVCAM VCR's.

Panasonic

Broadcast & Television Systems



AG-EZ1 3-CCD Digital Video Camcorder



- Digital recording delivers 500 lines of horizontal resolution with no noise. (S/N ratio is 54dB).
- 10.1 power and 20.1 digital zoom lens. Both zooms are adjustable in four speeds (3.5-15 sec.). For extreme close-ups the lens can focus up to 1/4" from the subject.
- Two digital audio modes, choose between two-channel 16-bit stereo recording or two sets of 12-bit stereo.
- Huge 1.5" 180,000 pixel color viewfinder with 400 lines of resolution displays all functions on demand.
- Digital Electronic Image Stabilizer (DEIS) compensates for jittery video. Particularly effective when the digital zoom is employed.

- Variable speed shutter from 1/60—1/8000 of a second.
- Built-in SMPTE time code generator.
- Digital Photo-Shot lets you record a still-frame for six seconds, while audio continues as normal. 290 still pictures can be recorded on a single 30-minute tape. TopScan function finds any shot easily.

\$1995

AG-EZ30 World's Smallest 3-CCD Camcorder w/IEEE1394 Interface

The AG-EZ30 combines 3-CCDs and the DV format to deliver a level of picture and sound quality that makes it one of the most advanced camcorders of its kind. Weighing just 1.5 lbs., this incredibly lightweight camcorder also incorporates a large 2.5-inch color LCD monitor and has a host of sophisticated auto functions as well full manual control when required.



- 3-CCDs (270,000 pixels each) with a large light-collecting area give the camera high sensitivity and wide dynamic range. Double-density pixel distribution and a gapless dichroic prism further ensure razor-sharp images and extremely faithful color reproduction.
- Selectable 2-channel 48 kHz/16-bit or 4-channel 32 kHz/12-bit PCM audio recording.
- Built-in stereo mic and external mic input as well.
- 180,000 pixel, 2.5-inch color LCD monitor. Also has a 0.5-inch color viewfinder.
- Digital Image Stabilizer for clear, shake and jitter free shots.
- 12X optical zoom as well as 30X and 120X digital zoom functions. Move from wide-angle to full zoom in 1.3 seconds allowing quick framing while in REC pause.

- Offers six digital effects: Wipe, Mix, Strobe, Gain-Up, B&W and still mode.
- Large-diameter focus ring enables a high level of focusing precision. A Multi-Function Push Dial allows easy setting of the 16-step iris, 5-step gain control (+12dB maximum) and 14-step shutter (up to 1/8000 second). Mic input level can also be set in steps (-20/-10/0/+3/-6 dB).
- Five program AE modes for shooting in a variety of different conditions. There is also a five-mode white balance: Set, Fluorescent, Auto, Indoor and Outdoor.

SONY

UVW-1600/UVW-1800

Betacam SP Editing Player • Betacam SP Editing Recorder

The UYW-1600 and UYW-1800 are the other half of the UYW series. They offer the superiority of Betacam SP with sophisticated editing features. They feature an RS-422 9-pin interface, built-in TBCs and Time Code operation. Inputs/outputs include component, composite and S-Video.

All the features of the UYW-1200/1400A PLUS—

- Optional BVR-50 allows remote TBC adjustment.
- RS-422 interface for editing system expansion.
- Two types of component output: via three BNC connectors or a Betacam 12-pin dub connector.
- Frame accurate editing is assured, thanks to sophisticated servo control and built-in time code operation. In the insert

mode of the UYW-1800,



video, audio Ch-1/2 and time code can be inserted independently or in any combination.

PVW-2600/PVW-2650/PVW-2800 Betacam SP Pro Series

Whenever versatility and no compromise performance is needed, there is only one choice. Legendary reliability and comprehensive support for its many users has established the PVW Series as the standard in broadcast and post production. The PVW Series includes the PVW-2600 Player, PVW-2650 Player with Dynamic Tracking and the PVW-2800 Editing Recorder. They feature built-in TBCs, LTC/VITC time code operation and RS-422 serial interface. They also offer composite, S-Video and component video inputs and outputs. Most important they are built for heavy, every day duty.



- Built-in TBC's and digital dropout compensation assure consistent picture performance. Remote TBC adjustment can be done using the optional BVR-50 TBC Remote Control.
- The PVW-2600, PVW-2650 and PVW-2800 (generates as well) read VITC/LTC time code as well as User Bits, Ext/Int time code, Regen/Preset, or Rec-Run/Free-Run selections.
- Built-in character generator displays time code or CTL data.
- Set-up menu for presetting many functional parameters.
- Two longitudinal audio channels with Dolby C-type NR.
- Recognizable monochrome pictures at up to 24X normal speed in forward and reverse. Color at speeds up to 10X.
- Two types of component connection: three BNC connectors

or a Betacam 12-pin dub connector. They have composite and S-Video signals as well.

PVW-2650 Only

- Dynamic Tracking (DT) playback from -1 to +3 times normal speed

PVW-2800 Only

- Built-in comprehensive editing facilities.
- Dynamic Motion Control with memory provides slow motion editing capability.

800 SERIES UHF WIRELESS MICROPHONE SYSTEMS



Consisting of 5 handheld and bodypack transmitters and 6 different receivers, Sony's UHF is recognized as the outstanding wireless mic system for professional applications. Operating in the 800 MHz band range, they are barely affected by external noise and interference. They incorporate a PLL (Phase Locked Loop) synthesized control system that makes it easy to choose from up to 282 operating frequencies, and with the use of Sony's pre-programmed channel plan, it is simple to choose the correct operating frequencies for simultaneous multi-channel operation. Additional features, like space diversity reception, LCD indicators, reliable and sophisticated circuit technology ensure low noise, wide dynamic range, and extremely stable signal transmission and reception. Ideal for broadcasting stations, film production facilities, and ENG work.

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Anton Bauer

HyTRON 50 Battery

Weighing a mere 31oz (880 grams) and packing 50 Watt-hours of energy - enough to operate a typical ENG camcorder for two hours, the HyTRON 50 is the most advanced lightweight battery in the industry.

- Made possible by recent advancements in a cell technology originally designed for the mobile computing industry, it incorporates nickel metal hydride cells that provide the highest energy density of any rechargeable cylindrical cell available. High performance is further assured through the integration of Anton/Bauer InterActive digital technology.

- Equipped with an on-board "fuel computer" which monitors energy input and output as well as critical operating characteristics and conditions. This data is communicated to the InterActive charger to ensure safety and optimize reliability.

- In addition, remaining battery capacity information is available by means of an LCD display on each battery and in the view-finder of the most popular broadcast & professional camcorders.

- Special low voltage limiter prevents potentially damaging overdischarge.

Specifications: 14.4 V, 50 WH (Watt Hours)

5-3/4" x 3-1/2" x 2-1/4", 1.9 lbs (880g)

Typical runtime: 2 hours @ 25 Watts 3 hours @ 17 Watts

QUAD 2702/2401

Four-Position Power/Chargers

The lightest and slimmest full featured four position chargers ever, they can fast charge four Gold Mount batteries and can be expanded to charge up to eight. They also offer power from any AC mount in a package the size of a notebook computer and weighing a mere four lbs! The 40 watt 2401 can charge ProPacs in two hours and TrnPacs in one. Add the Diagnostic/Discharge module and the QUAD 2401 becomes an all purpose power and test system. The 70 watt QUAD 2702 has the module and is the ultimate professional power system.

STEADICAM

VIDEO SK

Steadicam Video SK2

Incorporating the same design principles as its larger Oscar and Emmy winning Steadicam cousins, the Video SK 2 is designed for cameras weighing from 9-19 lbs. Far more compact and less complex, the complete SK2 system - sled, stabilizer arm and vest - weighs a mere 21 lbs. and fits neatly into the trunk of a car.

Balancing is easier than ever and a single battery operates both camera and Steadicam. In fact, the SK2 is the only Steadicam simple enough to be operated without workshop training. A comprehensive instructional video will have you up and running in hours. But make no mistake, the light-weight Video SK2 performs like a true heavy-weight. Shoot on the move effortlessly, without cranes, booms or dollies. The sled-mounted monitor offers a crystal-clear picture, so your eyes are no longer glued to your camera's eyepiece. And with the weight spread comfortably over your torso you can shoot on the run, climbing stairs or even from a moving vehicle. With one smooth tracking shot capture what used to require five or six setups. An optional low-mode bracket can further enhance your creativity. Whether you shoot commercials, industrials or documentaries, the SK2 lets you offer more flexibility than ever before. If you can imagine a shot, you can shoot it more efficiently, more economically and more creatively than with any other equipment.

GLIDECAM

INDUSTRIES

V-16 AND V-20

Camera Stabilization Systems

The V-16 and V-20 allow you to walk, run, go up and down stairs. Shoot from moving vehicles and travel over uneven terrain without any camera instability or shake. The V-16 stabilizes cameras weighing from 10 to 20 pounds and the V-20 from 15 to 26 pounds. They are both perfect for shooting the type of ultra-smooth tracking shots that take your audience's and client's breath away - instantly adding high production value to every scene. Whether you are shooting commercials, industrials, documentaries, music videos, news, or full length motion pictures, the Glidecam "V" series will take you where few others have traveled.



sachtler

Tripods & Fluid Heads

DV Systems—Digital Support for Every Budget

Today's compact digital cameras require light, fast and highly versatile camera support systems. Starting from the DV2 all the way up to the DV12, Sachtler has a solution tailored for just about every conceivable digital camera package available today. All feature Sachtler's patented counterbalance system and Touch and Go wedge plates. And all except the DV2 feature sliding camera platform to ease in the balancing of your camera.

DV2 System

- The smallest head of the Sachtler's line.
- Sachtler Touch and Go quick release with automatic camera lock and safety lever/drop protection.
- One step of dynamic counterbalance.
- Frictionless leak proof fluid damping with one levels of drag.
- Vibrationless vertical/horizontal brakes.
- Built in bubble for horizontal leveling.
- Single Stage 75mm tripod DA 75 Long.
- Lightweight floor spreader SP 75.

This system (0210) consists of:
Fluid Head (DV-2), Long Tripod (DA 75), floor spreader (SP 75)

DV4XD System

- Same as the DV4 PLUS —
- Five step of dynamic counterbalance.
 - Five step of vertical and horizontal drag.
- DV4XD System (0610) consists of:
Fluid Head (DV 6), Long Tripod (DA 75), floor spreader (SP 75)

DV4 System

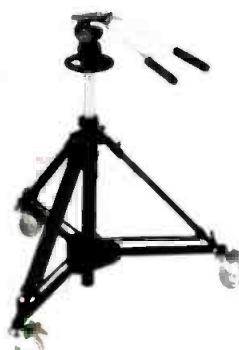
- Sliding balance plate.
- Touch and Go quick release with automatic camera lock and safety lever/drop protection.
- One step of dynamic counterbalance.
- Frictionless leak proof fluid damping with one levels of drag.
- Vibrationless vertical/horizontal brakes.
- Built in bubble for horizontal leveling.
- Single stage 75mm long Tripod DA 75.
- Lightweight floor spreader SP 75.

DV4 System (0410) consists of:
Fluid Head (DV-4), Long Tripod (DA 75), floor spreader (SP 75)

DV8 System

- Same as DV6 PLUS —
- Greater load capacity.
- DV8 System (0810) consists of:
Fluid Head (DV-8), Long Tripod (DA 75), floor spreader (SP 75)

DV12 Same as DV8 PLUS — • Great Load Capacity • Fits 100mm tripods



Vinten

PRO-130 SYSTEMS

The Pro-130 tripod systems are perfect for today's on the move ENG cameramen. Lightweight, these systems have been specifically designed to provide a wider balance range to suit the latest DV, DVCPRO, DVCAM camcorder and camera/recorder combinations. All systems come complete with the PH-130 fluid pan & tilt head, choice of single or 2-stage ENG tripod, floor spreader and soft carrying case for easy transportation. The PH-130 pan & tilt head incorporates Vinten's continuously variable LF drag system to provide smooth movement and easy transition into whip pan. Together with a factory set balancing mechanism. Both the single-stage and two-stage legs are toggle clamp tripods are made from strong, durable aluminum with excellent height range capabilities.

VISION 8 AND 11 Lightweight Heads For the Future

Superbly engineered and designed for use in professional broadcast, educational and corporate productions, the Vision 8 and Vision 11 simultaneously provide the ultimate in lightweight support with exceptional robustness—even in the toughest shooting conditions.

Vision 8 Pan & Tilt Head

- The incredibly lightweight Vision 8 provides smooth shots, whip pan action and quick set-up while supporting up to 23 lbs. Add the single-stage carbon fiber tripod and you have the lightest combination possible for that all important event—without sacrificing the reliability and robustness that you require.
- Simple external adjustment for perfect balance over the full 180° of tilt.
 - Infinitely variable drag with proven LF technology.
 - Calibrated drag knobs.
 - Flick on/off Pan and Tilt brakes.
 - Single rotation counterbalance.
 - Leveling bubble standard.
 - Standard 100mm leveling ball • Lightweight, only 5.9 lbs

Vision 11 Pan & Tilt Head

- Slightly heavier the Vision 11 offers additional capacity (up to 29 lbs.) plus it has illuminated controls to allow fast camera balancing and leveling even in poor lighting. Combine with a two-stage carbon fiber or aluminum tripod and you have a package with the biggest height adjustment yet the smallest to carry. Ideal for all ENG assignments.
- Simple external adjustment for perfect balance over the full 180° of tilt.
 - Infinitely variable drag with proven LF technology.
 - Back-tilt and calibrated drag knobs.
 - Flick on/off Pan and Tilt brakes.
 - Digital counterbalance readout.
 - Illuminated leveling bubble • Standard 100mm leveling ball.
 - High load to weight ratio • Lightweight — only 6.2 lbs.

QTV

15" and 17" On Camera Prompters

The 15" and 17" On Camera prompter is the industry standard and designed for use with any camera, for any application. The high contrast, high resolution monitor, created by QTV, is the result of state of the art components and design. The monitor permits a much greater degree of tilt because of its cutaway feature. Its VPS Eyeline feature superimposes copy over the camera lens, enabling the reader to maintain maximum eye-to-eye contact. It's easy and comfortable to read. QTV's On Camera prompter will make sure the talent has clear access to the prompter. The 17" model has a viewing area of 123 sq. inches, 39% more than the 15" model. The 15" On Camera prompter is also available in a free standing pedestal model, which can be utilized both in the studio and in remote situations.

MVP-11

The MVP-11 incorporates QTV's latest design technology for studio and EFP prompting. The MVP-11 features the most advanced circuitry for a prompter of this size. Fully self-contained, it offers high brightness and high resolution that ensures unmatched ease of readability for the speaker. The MVP-11 is powered by AC or DC current utilizing the Sony type NP-1 or Anton Bauer 13-14 volt batteries, allowing on-location as well as studio prompting. It weighs only 19 lbs, including the quick release roller plate for fast mounting and balancing. Below the lens mounting is utilized resulting ideal counter balancing for ease of operation.

MVP-9 Mini Videoprompter

The MVP-9 mini videoprompter is designed for use with smaller cameras and small spaces. The same level of performance is achieved as the larger CRT based units but in a smaller configuration that is powered by AC or DC current (as above). Created for the new generation of smaller, lighter cameras, the MVP-9 weighs only 17 1/2lbs and both the monitor and camera mount set up quickly and easily. As with the other units the VPS Eyeline feature assures maximum eye contact with lens while easily reading the script. It packs up very tightly, making it easy to take anywhere.



PROFESSIONAL VIDEO TAPES



Professional Grade VHS		
PG-30	2.39	PG-60 2.59 PG-120 2.7
Broadcast Grade VHS Box		
BGR-30	3.49	BGR-60 4.19 BGR-120 4.6
M471S S-VHS Double Coated		
ST-30	6.89	ST-60 7.69 ST-120 7.9
M221 Hi 8 Double Coated		
Metal Particles		Metal Evaporated
P630HMP	4.99	E630HME 7.6
P660HMP	6.29	E660HME 10.6
P6120HMP	8.29	E6120HME 14.1
M321SP Metal Betacam (Box)		
05S	12.39	10S 12.99 20S 13.3
30S	15.49	60L 25.49 90L 30.9
DP121 DVC PRO		
12M (Med.)	7.49	23M 8.79 33M 10.9
63M	19.99	64L (Lg.) 22.5
94L	31.99	123L 39.99

maxell

Hi8 Metal Particle (XRM)		
P6-120 XRM		6.99
Broadcast Quality Hi8 Metal Particle		
P6-30 HM BQ	5.39	P6-60 HM BQ 6.09
P6-120 HM BQ		7.99
P1 PLUS VHS		
T-30 Plus	1.69	T-60 Plus 1.99 T-90 Plus 2.09
T-120 Plus		2.19 T-160 Plus 2.69
HGX-PLUS VHS (Box)		
HGXT-60 Plus	2.69	HGXT-120 Plus 2.99
HGXT-160 Plus		3.99
BQ Broadcast Quality VHS (Box)		
T-30 BQ	3.89	T-60 BQ 3.99 T-120 BQ 5.99
BQ Professional S-VHS (In Box)		
ST-31 BQ	6.79	ST-62 BQ 6.99
ST-126 BQ	7.45	ST-182 BQ 13.99
Betacam SP		
B30MSP	13.49	B60MLSP 19.99 B90MLSP 29.95

Panasonic

Mini DV Tape		
AY DVM-30	6.49	AY DVM-30 (10 Pack) ea. 5.99
AY DVM-60	7.99	AY DVM-60 (10 Pack) ea. 7.49
AY DVM80	16.99	AY DVM-120 21.95
DVCPRO		
AJ-P12M (Medium)	6.99	AJ-P23M 9.99
AJ-P33M	11.19	AJ-P66M 19.49
AJ-P64L (Large)	20.99	AJ-P94L 30.99
AJ-P126L		44.99

SONY

Hi-8 Professional Metal Video Cassettes		
P6-30 HMPX	4.59	P6-30 HMEX 7.99
P6-60 HMPX	6.49	P6-60 HMEX 10.99
P6-120HMPX	8.49	P6-120HMEX 14.99
PR Series Professional Grade VHS		
T-30PR	2.39	T-60PR 2.59 T-120PR 2.79
PM Series Premier Grade Professional VHS		
T-60PM		3.99
BA Series Premier Hi-Grade Broadcast VHS (In Box)		
T-30BA	3.59	T-60BA 3.99 T-120BA 4.79
MQ Master Quality S-VHS (In Box)		
MQST-30	7.49	MQST-60 7.79 MQST-120 7.99
BRS 3/4" U-matic Broadcast Standard (In Box)		
KCS-10 BRS (mini)	8.69	KCS-20 BRS (mini) 8.99
KCA-10 BRS	8.19	KCA-20 BRS 8.69
KCA-30 BRS	9.60	KCA-60 BRS 13.39
XBR 3/4" U-matic Broadcast Master (In Box)		
KCS-10 XBR (mini)	8.79	KCS-20 XBR (mini) 10.59
KCA-10 XBR	9.29	KCA-20 XBR 10.69
KCA-30 XBR	11.99	KCA-60 XBR 15.69
KSP 3/4" U-matic SP Broadcast (In Box)		
KSP-S10 (mini)	9.59	KSP-S20 (mini) 11.09
KSP-10	10.09	KSP-20 11.59
KSP-30	12.99	KSP-60 16.99
BCT Metal Betacam SP Broadcast Master (Box)		
BCT-5M (small)	12.29	BCT-10M (small) 13.09
BCT-20M (small)	13.29	BCT-30M (small) 14.49
BCT-30M (small) (50 Pack)		ea. 13.49
BCT-30ML	18.99	BCT-60ML 23.49
BCT-90ML		34.99
Mini DV Tape		
DVM-30EXM w/Chip	14.99	DVM-60EXM w/Chip 17.99
DVM-30EX "No Chip"	12.99	DVM-60EX "No Chip" 13.99
DVM-30PR "No Chip"	9.99	DVM-60PR "No Chip" 10.49
Full Size DV Tape with Memory Chip		
DV-120MEM	25.89	DV-180MEM 29.99
PDV Series Professional DVCAM Tape		
PDVM-12ME (Mini)	15.25	PDVM-22ME (Mini) 16.25
PDVM-32ME (Mini)	16.99	PDVM-40ME (Mini) 18.49
PDV-94ME (Standard)	33.49	PDV-124ME (Standard) 37.99
PDV-184ME (Standard)	44.95	PDV-64N 24.95
PDVN-124N	31.95	PDVN-184N 39.95

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FUJINON ENG LENSES

While ENG camera technology evolves faster and faster, delivering ever higher performance in ever smaller bodies, it has been increasingly difficult for lens manufacturers to improve quality while keeping size and weight to a minimum until recently. With Aspheric Technology (A12) Fujinon has succeeded in manufacturing superior quality lenses that are both smaller and lighter than lenses of conventional spherical design. From the widest angle to the highest telephoto, Fujinon's broadcast hand-held style lenses offer unparalleled features and performance. In fact, they are so advanced and so optically superb they will reshape your thinking about how well a lens can perform.



Fujinon's broadcast hand-held lenses feature the very latest in optical and mechanical design, and manufacturing techniques. New EBC (Electron Beam Coating) reduces flare and improves contrast, while AT2 Aspheric Technology improves corner resolution and reduces chromatic aberration. And all except the 36:1 Super Telephoto offer the exclusive "V-Grip" and Quick Zoom.

A15X8EVM Standard Zoom Lens
A versatile performer in a compact package, offers AT2, inner focus, Quick Zoom and the "V-Grip" **\$495.95**

A20X8EVM Standard/Telephoto Zoom Lens
Combines additional focal length with AT2, inner focus, Quick Zoom and the "V-Grip" **\$1,499.95**

CHYRON PC-CODI & PC Scribe

Text and Graphics Generator and Video Titling Software

PC-CODI incorporates a broadcast quality encoder and a wide bandwidth linear keyer for the highest quality, real-time video character generation and graphics display. A video graphics software engine running under Windows 95/NT, PC Scribe offers a new approach and cost effective solution for composing titles and graphics that is ideal for video production and display applications. Combined, their total solution for real-time character generation with the quality you expect from Chyron.

PC-CODI Hardware:

- Fully-antialiased displays • Display and non-display buffers
- Less than 10 nanosecond effective pixel resolution
- 16 million color selections • Fast, real-time operations
- Character, Logo and PCX Image transparency
- Variable edges: border, drop shadow, and offset
- Full position and justify control of character and row
- User definable intercharacter spacing (squeeze & expand)
- Multiple roll/crawl speeds • Automatic character kerning
- User definable tab/template fields
- Shaded backgrounds of variable sizes and transparency
- Software controlled video timing



- User definable read effects playback: wipes, pushes, fades
- NTSC or PAL sync generator with genlock
- Board addressability for multi-channel applications
- Auto display sequencing • Local message/page memory
- Preview output with safe-title/cursor/menu overlay
- Composite and S-video input with auto-genlock select

PC-Scribe Software:

- Number of fonts is virtually unlimited. Also supports most international language character sets. Fonts load instantly and the level of anti-aliasing applied is selectable.
- Adjust a wide range of character attributes. Wide choice of composition tools.
- Characters, words, rows and fields can color flash
- Character rolls, crawls and reveal modes. Speed is selectable and can be auto timed with pauses. Messages can be manually advanced or put into sequences along with page transitions.

- Multiple preview windows can be displayed simultaneously.
- Transitions effects include: cut, fade, push, wipe, reveal, peel, zoom, matrix, wipe, spiral, split, weave and jitter.
- Import elements to build graphics. This includes OLE objects, INFINITI RGB and TGA with alpha channel. Scribe also imports and exports TIFF, JPEG, PCX, TGA, BMP, GIF, CLP, ASCII, IMG, SGI, PICT and EPS formats.

PC-CODI and PC-Scribe Bundle **\$2995.00**



TRUEVISION/Avid

Professional Video Production Workstation

Incorporating the award-winning TARGA 1000 video card and Avid MCXpress NT non-linear editing software, this fully-configured Workstation meets the needs of production professionals, corporate communicators, educators and Internet authors.

TARGA 1000 Features:

- The TARGA 1000 delivers high processing speed for video and audio effects, titling and compositing. Capture, edit and playback full-motion, full-resolution 60 fields per second digital video with fully synchronized CD-quality audio.
- Compression can be adjusted on the fly to optimize for image quality and/or minimum storage space. Has composite and S-video inputs/outputs. Also available with component input/output (TARGA 1000 PRO).
- Genlock using separate sync input for working in professional video suites
- Audio is digitized at 44.1KHz or 48KHz sampling rates, for professional quality stereo sound. Delivers perfectly synchronized audio and video.

MCXpress Features:

The ideal tool for video and multimedia producers who require predictable project throughput and high-quality results when creating video and digital media for training, promotional/marketing material, local television and cable commercials, CD-ROM and Internet/intranet distribution. Based on Avid's industry-leading technology, it combines a robust editing functionality with a streamlined interface. Offers integration with third-party Windows applications, professional editing features, powerful media management, title tool and a plug-in effects architecture. It also features multiple output options including so you save time and money by reusing media assets across a range of video and multimedia projects.

TARGA 1000/MCXpress Turnkey Systems:

- 300-watt, 6-Bay Full Tower ATX Chassis
- Pentium ATX Motherboard with 512K Cache
- Pentium II- 300 MHz Processor
- Matrox Millennium II AGP 4MB VRAM Display Card
- 61MB 10ns 168-Pin (DIMM) S-DRAM
- Quantum Fireball 6.4GB IDE System Drive
- Seagate Barracuda External 9.1GB SCSI-3 Ultra Wide Capture Drive
- Adaptec AHA-2940UW Ultra Wide SCSI-3 Controller Card
- Triac CD-532e 32X EIDE Internal CD-ROM Drive • 3.5" Floppy Drive
- Atec-Lansing ACS-48 3-Piece Deluxe Speaker System
- Viewsonic G771 17-inch (1280 x 1024) Monitor (0.27mm dot pitch)
- Focus 2001A Keyboard • Microsoft MS Mouse
- Windows NT 4.0 Operating System Software
- Avid MCXpress for Windows NT
- Truevision TARGA 1000 or 1000 Pro Video Capture Card

With TARGA 1000 **\$5995.00**
With TARGA 1000 Pro (component input/output) **\$6495.00**

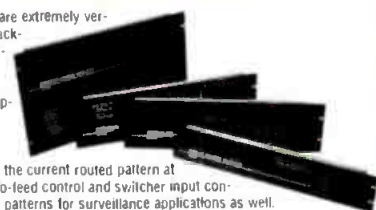


KNOX VIDEO

RS4x4/8x8/16x16/16x8/12x2

Video/Audio Matrix Routing Switchers

Knox's family of high performance, 3-channel routing switchers are extremely versatile, easy-to-use and very affordable. Housed in an ultra-thin rack-mount chassis they accept and route (on the vertical interval) virtually any video signal, including off-the-air and non-timebase corrected video. They also route balanced or unbalanced stereo audio. The audio follows the video or you can route the audio separately (breakaway audio). Each of the switchers offers manual control via front panel operation. They can also be controlled remotely by a PC, a Knox RS Remote Controller, or by a Knox Remote Keypad via their RS-232 port. Front panel LEDs indicate the current routed pattern at all times. Knox switchers are ideal for applications such as studio-feed control and switcher input control, plus they have an internal timer allowing timed sequence of patterns for surveillance applications as well.



- Accept and routes virtually any one-volt NTSC or PAL video signal input to any or all video outputs.
- Accept and route two-volt mono or stereo unbalanced audio inputs to any or all audio outputs.
- Video and audio inputs can be routed independently, they don't need to have the same destination.
- Can store and recall preset cross-point patterns. (Not available on RS12x2.)
- Front panel key-pad operation for easy manual operation.
- Can also be controlled via RS-232 Interface with optional RS Remote Controller or Remote Keypad.
- Front panel LED indicators display the present routing patterns at all times.
- An internal battery remembers and restores the current pattern in case of power failure.
- Internal vertical interval switching firmware allows on-air switching.
- Housed in a thin profile rackmount 1" chassis.
- Also except the RS12x2 are available in S-Video versions with/without audio.
- Models RS16x8 and RS16x16 are also available in RGB/component version.
- With optional Remote Video Feedout, the RS16x8 and RS16x16 can display active routes on a monitor at remote locations, via a composite signal from a BNC connector on the rear panel.
- The RS4x4, RS8x8 and RS16x16 are also available with balanced stereo audio. They operate at 660 ohms and handle the full range of balanced audio up to +4 dB with professional quick-connect, self-locking, bare-wire connectors.

LEADER

Manufacturing test and measurement equipment for over 40 years, Leader Instruments is the standard which others are measured against for reliability, performance, and most important—cost effectiveness.

5860C WAVEFORM MONITOR

A two-input waveform monitor, the 5860C features 1H, 1V, 2H, 2V, 1 s/div and 2V mag time bases as well as vertical amplifier response choices of flat, IRE (low pass), chroma and DIF-STEP. The latter facilitates easy checks of luminance linearity using the staircase signal. A PIX MON output jack feeds observed (A or B) signals to a picture monitor, and the unit accepts an external sync reference. Built-in calibrator and on-off control of the DC restorer is also provided.

5850C VECTORSCOPE

The ideal companion for the 5860C, the 5850C adds simultaneous side-by-side waveform and vector monitoring. Featured is an electronically-generated vector scale that precludes the need for fussy centering adjustments and eases phase adjustments from relatively long viewing distances. Provision is made for selecting the phase reference from either A or B inputs or a separate external timing reference.



5100 4-Channel Component / Composite WAVEFORM

The 5100 handles three channels of component signals, plus a fourth channel for composite signals, in mixed component / composite facilities. Features are overlaid and parade waveform displays, component vector displays, and automatic bow-tie or "shark fin" displays for timing checks. Menu-driven options select format (525/60, 625/50, and 1125/60 HDTV), full line-select, vector calibration, preset front-panel setups and more. On-screen readout of scan rates, line-select, preset numbers, trigger source, cursor time and volts.

5100D Digital Waveform/Vectorscope

The 5100D can work in component digital as well as component analog facilities (and mixed operations). It provides comprehensive waveform, vector, timing and picture monitoring capabilities. Menu driven control functions extend familiar waveform observations into highly specialized areas and include local calibration control, the ability to show or blank SAV/EAV signals in both the waveform and picture, the ability to monitor digital signals in GBR or YCbCr form, line select (with an adjustable window), memory storage of test setups with the ability to provide on-screen labels, flexible cursor measurements, automatic 525/60 and 625/50 operation and much much more.

5870 Waveform/Vectorscope w/SCH and Line Select

A two-channel Waveform/Vector monitor, the microprocessor-run 5870 permits overlaid waveform and vector displays, as well as overlaid A and B inputs for precision amplitude and timing/phase matching. Use of decoded R-Y allows relatively high-resolution DG and DP measurements. The 5870 adds a precision SCH measurement with on-screen numerical readout of error with an analog display of SCH error over field and line times. Full-raster line select is also featured with on-screen readout of selected lines, a strobe on the PIX MON output signal to highlight the selected line, and presets for up to nine lines for routine checks.

5872A Combination Waveform/Vectorscope

All the operating advantages of the 5870, except SCH is deleted (line select retained), making it ideal for satellite work.

5864A Waveform Monitor

A two-input waveform monitor that offers full monitoring facilities for cameras, VCRs and video transmission links. The 5864A offers front panel selection of A or B inputs, the choice of 2H or 2V display with sweep magnification, and flat frequency response or the insertion of an IRE filter. In addition, a switchable gain boost of X4 magnifies setup to 30 IRE units, and a dashed graticule line at 30 units on screen facilitates easy setting of master pedestal. Intensity and focus are fixed and automatic for optimum display. Supplied with an instruction manual and DC power cable.

5854 Vectorscope

A dual channel compact vectorscope, the 5854 provides precision checkout of camera encoders and camera balance, as well as the means for precise genlock adjustments for two or more video sources. Front panel controls choose between A and B inputs for display and between A and B for decoder reference. Gain is fixed or variable, with front panel controls for gain and phase adjustments. A gain boost of 5X facilitates precise camera balance adjustments in the field. Supplied with a DC power cable.

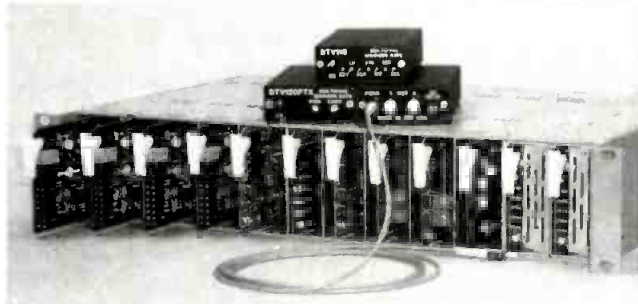
Designed for EFP and ENG (electronic field production and electronic news gathering) operations, they feature compact size, light weight and 12 V DC power operation. Thus full monitoring facilities can be carried into the field and powered from NP-1 batteries. Battery belts and vehicle power. Careful thought has been given to the reduction of operating controls to facilitate the maximum in monitoring options with the operating simplicity demanded in field work.

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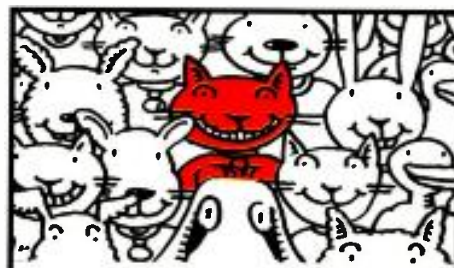
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Wonder antennas, broadcasting and the cable system

BY PAUL MCGOLDRICK

It certainly made me sit up and take notice; a flyer in the Sunday newspaper from Radio Shack trying to sell a DSS system with the tag "Surf over 210 satellite channels plus all your local stations." This miracle — for some of us — is achieved by selling the customer a choice of two antennas and a satellite system.

One of the antennas, the lesser model, was described as an attic/outdoor antenna with a range up to 90 miles. The better model was described as a long-range outdoor antenna with a range up to 190 miles. There was small print, of

course, but I have relative to TV reception; they would love for these mileage claims to be true.

In my case, I put myself back into that situation. I recently became entirely fed up with the problems from my satellite provider: the quality of the decoder, black levels all over the place and lip sync shortcomings visible even to a child. In addition, the LNBS was intermittent when switching between odd and even translators, if it got too warm, if it got too cold, if it got too damp — and its technical service people all but ignored me.

house is probably no more than 45 feet above sea level.

Do you know how helpless this makes me feel, and how angry I am with people who don't understand what they are doing? The nearest CBS affiliate is 25 miles away — the only TV station in a city of 10,000 people. At least they understand that reception from them is impossible. But what NBC station thinks I am able to pick up a Grade A signal? It is now up to me to find out and formally gripe at them, threaten them with adverse publicity and whatever else I can do. But the one that really bothers me is PBS. I would rather get the local state feed of PBS than the satellite rebroadcast PBS-X feed on East Coast time. There is absolutely no reason why I wouldn't be able to receive the station's translator if it wasn't for the cable company. That system is all above ground, has major splices in it, and every time the city has expanded I have the feeling the technicians simply cranked up the signal levels at the head-end so that they would reach further.

As a simple experiment, I set up a VHF antenna with about 20dB of gain. From within the house I can receive the entire spectrum of the cable system; I am not advocating illegal reception of cable systems in this way — and you won't find it happening in my house — but what kind of slaphappy engineering can we allow these people to get away with?

To receive my primary legal off-air feed of Channel 2, I am now going to have to go for enforcement by the FCC. Wish me luck, and if you have similar problems, share your misery with me. ■

Paul McGoldrick is an industry consultant based on the West Coast.



Send questions and comments to:
paul_mcgoldrick@intertec.com

Using a VHF antenna with about 20dB of gain, I can receive the entire spectrum of the cable system from within the house

course. The estimated range was based on outdoor reception over flat and open terrain. Maybe they should have added that the antennas would have to be mounted on a 1500-foot tower with zero feeder length between the antennas and receiver. And even then I'm not sure whether — even in Kansas — a usable signal would be obtained.

Added to these miserable claims is the information that the kit of parts includes two diplexers to combine satellite and antenna signals into a single lead-in wire. Presumably the second diplexer is for the split back to the separate feeds to the satellite receiver; but those two diplexers are another minimum 6dB knock to the received signal strength.

Well, I'm not in Kansas anymore and this nonsense gets my goat; I don't like to see Joe P. Consumer being duped by a major corporation. There are plenty of people who are vulnerable, many of whom find themselves in the same situ-

ation I have relative to TV reception; they would love for these mileage claims to be true.

Now, I am in a position that all too many people are in: no network services automatically from the satellite. After three weeks, CBS and Fox were activated, but I have no PBS or NBC from the heavens. I will not complain about ABC because a station about 75 miles away had the commercial common sense to put in a 5W translator that provides the only Grade A signal I can receive. There aren't any other Grade A anything's available. The only other translator in town is a 1W box for PBS. It took forever to get up and running and is completely overwhelmed in the neighborhoods by the radiation from the 1970s vintage cable system.

So, what do I do? Go out and buy a regularly priced \$139.97 antenna from Radio Shack to get signals from the nearest market of any size, 75 miles away? I don't think so. Those 5000-foot mountains in the middle of the reception path certainly don't offer flat and open terrain. Oh, and the top of my

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